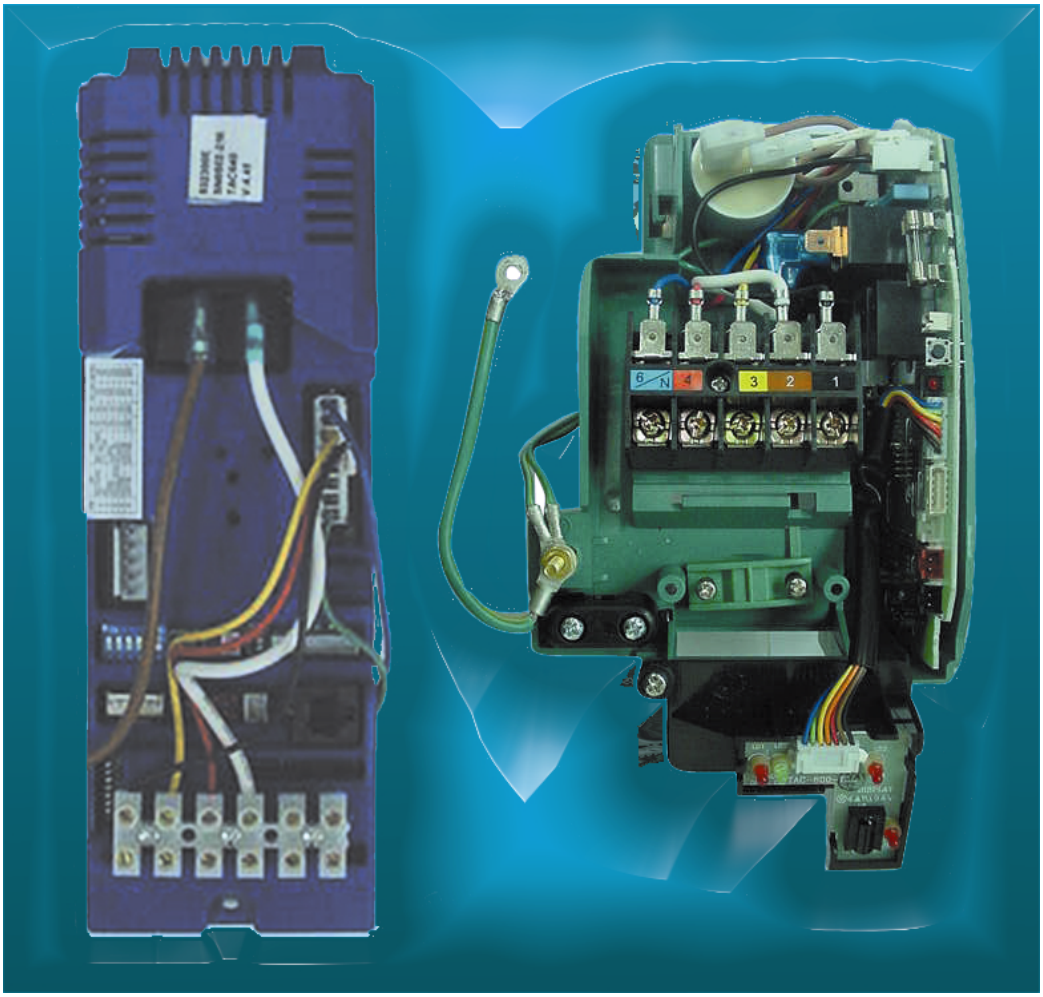
TAC600

Air Conditioner Electronic Controller Family

Service Manual



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Industrial Park P.O.B 1116 Afula - Elite 18110 ISRAEL
Tel: (972)-4-6428511 Fax: (972)-4-6428507

TADIRAN Appliances Ltd.

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A/C	Air Conditioner
A/D	Analogue to Digital Converter
BMS	Building Management System
DIP	Dual in Line Package
IR	Infrared
LCD	Liquid Crystal Display
LED	Light Emitting Diode
NC	Not Connected
N/A	Not Applicable
PCB	Printed Circuit Board
R/C	Remote Control
RVS	Reversing Valve
T/S	Twin/Single Compressor
RAM	Random Accesses Memory
ROM	Read Only Memory

Table 1: Abbreviations in use throughout this document:

1 General

1.1 Scope

The TAC600 family of Air Conditioner Controllers electronically controls the operation of Tadiran's air conditioner units and displays the air conditioner status and faults (if any) on a Display unit (LEDs). The electronic controller receives input from various: sensors (i.e. temperature), user interface devices (i.e. Remote Control unit, pushbuttons on Display units) and using the imbedded software, controls the operation of the indoor and outdoor units.

The TAC600 family of Air Conditioner Controllers consists of the following electronic controller models:

- TAC600TGL
- TAC601
- TAC603
- TAC640

Refer to Table 3 (page 8) for air conditioner configuration

1.2 Main System Features

1.2.1 Standard Features on all Models

- 5 Working Modes: Cooling, Heating, Fan, Dry (Dehumidify) and Auto
- 3 Indoor Fan Speeds
- 2 Outdoor Fan Speeds
- 4 Status LEDs (Power ON, Power OFF, Filter and Service)
- Temperature Setting
- 3 Timers Plus Sleep Timer
- Daily Timer
- Infrared (IR) Temperature/Mode Control and Timer Programming Via Remote Control Unit (R/C)
- Parameters Saved in EEPROM (Non-Volatile Memory)
- Auto Restart (after Power Failure)
- Protections (High/Low Pressure, Noise, Freezing, High/Low Voltage)
- Sensorless Defrost
- Self Diagnostics
- Sweeping Louver Control
- Communication: RS232, RS485, Modem

1.2.2 Optional Features for all Models

- 7 Additional Inputs
- 4 Outputs from Relays
- Voltage Measurement Sensor
- BMS (Building Management System) Input

1.2.3 Model Specific Features

	TAC600TGL	TAC601	TAC603	TAC640
Hall Effect	X		X	
8 LED/2 Digit Numeric Displays and 4 Pushbuttons (Option)				X
Heating Element		X		X
6 Inputs for Room Units		X		X
T/S Operation		X		X

Table 2: Model Specific Features

1.3 Air Conditioner Configuration

The table below describes Tadiran's air conditioner models and the controller and display units packaged with them.

Tadiran's Air Conditioner Model	Controller Unit Model	Display Unit Model
TGL 9-25	TAC600TGL	Built-in 4 LED display
TGL 30	TAC603	Built-in 4 LED display
TGL 33,35	TAC601	Built-in 4 LED display
GFL	TAC640	TAC660GFL (4 LEDs)
TNL20-50	TAC640	TAC660TNL (4 LEDs)
TFL 9-15	TAC640	TAC660TFE (4 LEDs)
GCL	TAC640	TAC660GCL (microprocessor, 8 LEDs, 2 digits, 5 Pushbuttons)
AN, AVL	TAC640	TAC660RTX (Microprocessor, 8 LEDs, 2 digits, 5 pushbuttons)
TS	TAC640	TAC660RTX (microprocessor, 8 LEDs, 2 digits, 5 pushbuttons)

Table 3: Configuration Table

NOTE:

The control provides type 1 micro-interruption automatic action (Type 1.C control).

2 Operation

2.1 The Electronic System Structure

Tadiran's electronic system structure is composed of three main parts:

- **Controller Unit** consists of:
  - PCB
  - Embedded software
  - Service LED
  - Fuse (6A)
  - DIP switches
  - Connectors and Terminal block
- **Display Units** consist of:
  - LED indicators (4 or 8 depending on model)
  - Infrared (IR) receiver
  - Microprocessor (TAC660RTX and TAC660GCL models)
  - Two digit numerical display (TAC660RTX and TAC660GCL models)
  - Five pushbuttons (TAC660RTX and TAC660GCL models)
- **Remote Control (R/C) device** consists of:
  - Multifunction LCD display
  - Infrared (IR) transmitter
  - Pushbutton pad
  - Microprocessor
  - Temperature sensor (thermistor)

2.2 Communication:

The electronic controller monitors system performance and identifies faults via input received from the following sensors:

- **Temperature** - measured by the thermistors located at the Return-Air (TH1, indoor), Evaporator coil (TH2, indoor) and Condenser coil (TH3, outdoor).
- **Power** –measures power line voltage.
- **Pressure** – detects low pressure and high pressure states

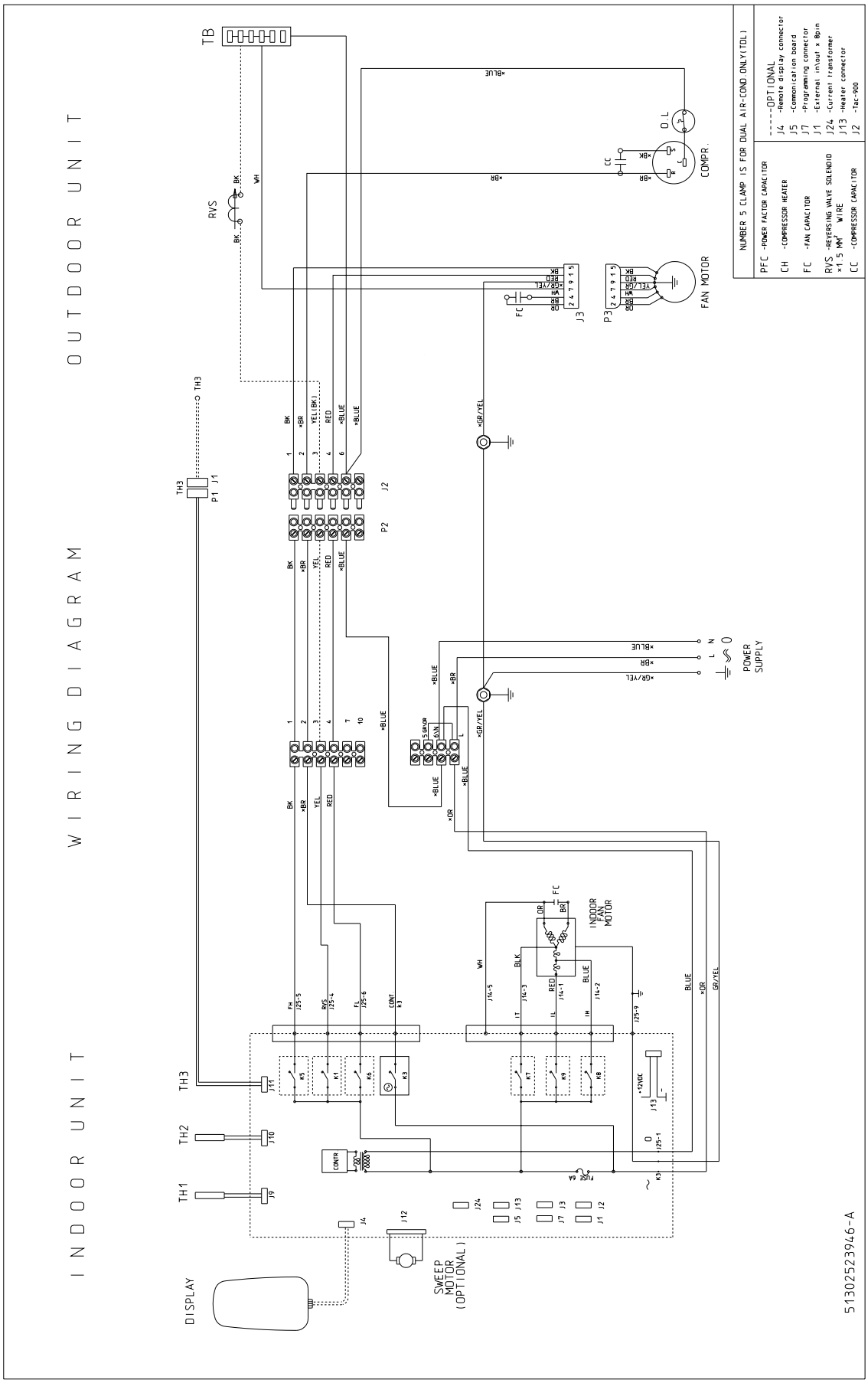
Faults are indicated by flashing LEDs on displays (and a single Service LED on Controller) and by numbers on models with numeric display. The electronic controller receives the following User inputs (via R/C, room control unit or front panel display):

- Power (ON/OFF)
- Air conditioner mode (Cool, Heat, Fan, Dry, Auto)
- Fan speed
- Setpoint temperature
- Sweep louver
- Clock setting (R/C only)
- Timer settings (R/C only)
- Room temperature

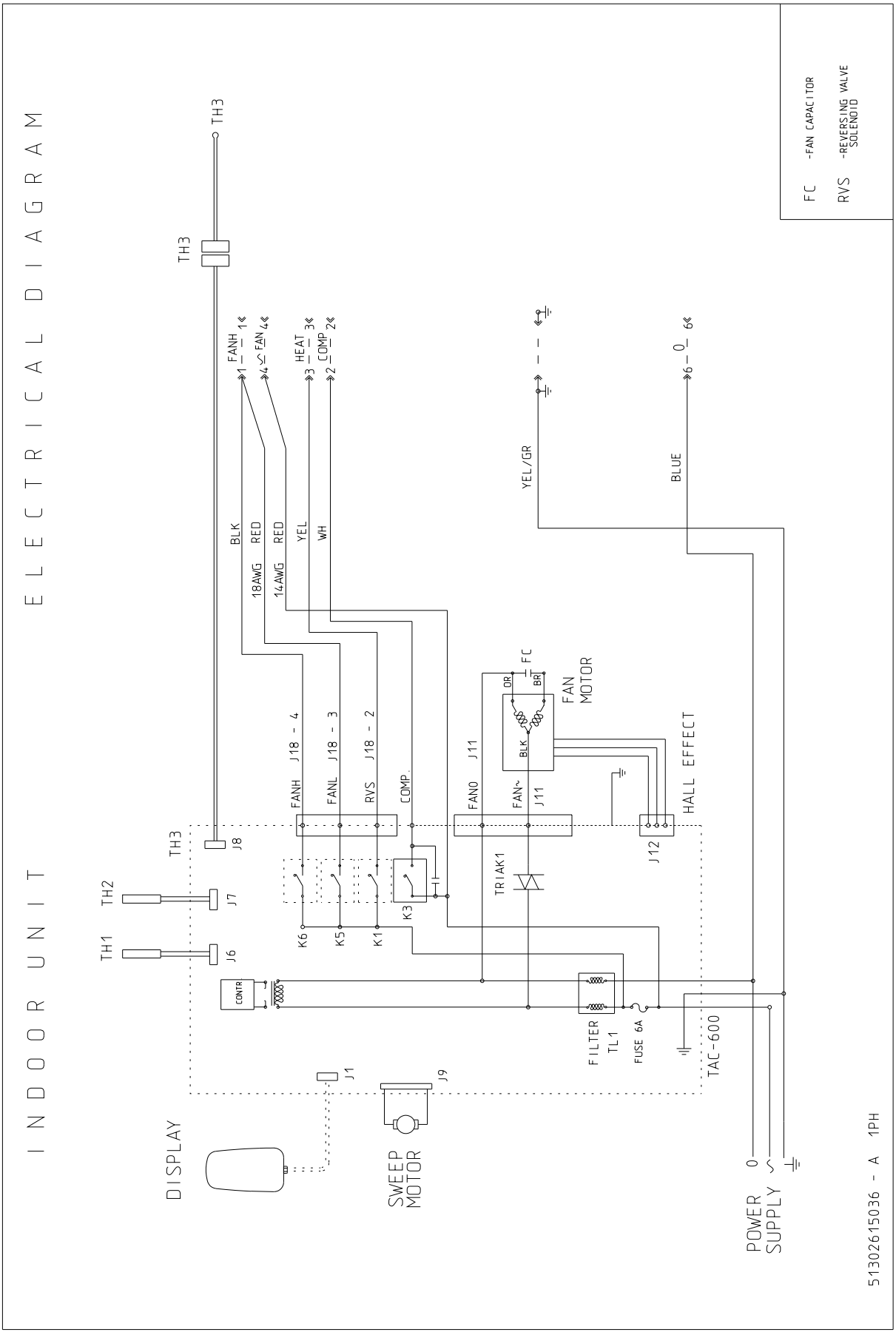
2.3 Air Conditioner Electrical Drawings

Drawing Catalog number	Models	Phases	Drawing. No.
5130-2523946	TNL9-25	1 ph.	Drawing 1
5130-2615036	DGL 9-20	1 ph.	Drawing 2
5130-2525736-B	TNL, AVL, GCL	1 ph.	Drawing 3
5130-2625731	AVL, TNL	3 ph.	Drawing 4
5130-2525796	ANL	1 ph.	Drawing 5
5130-2525791	ANL-S (50-75)	3 ph.	Drawing 6
5130-2523966	TGL 9-25	1 ph.	Drawing 7
5130-2523976	TGL 30	1 ph.	Drawing 8
5130-2523956	TGL 35	1 ph.	Drawing 9
5130-2643746	TDL	1 ph.	Drawing 10
5130-2525736	GFL	1 ph.	Drawing 11
5130-2625731	GFL	3 ph.	Drawing 12

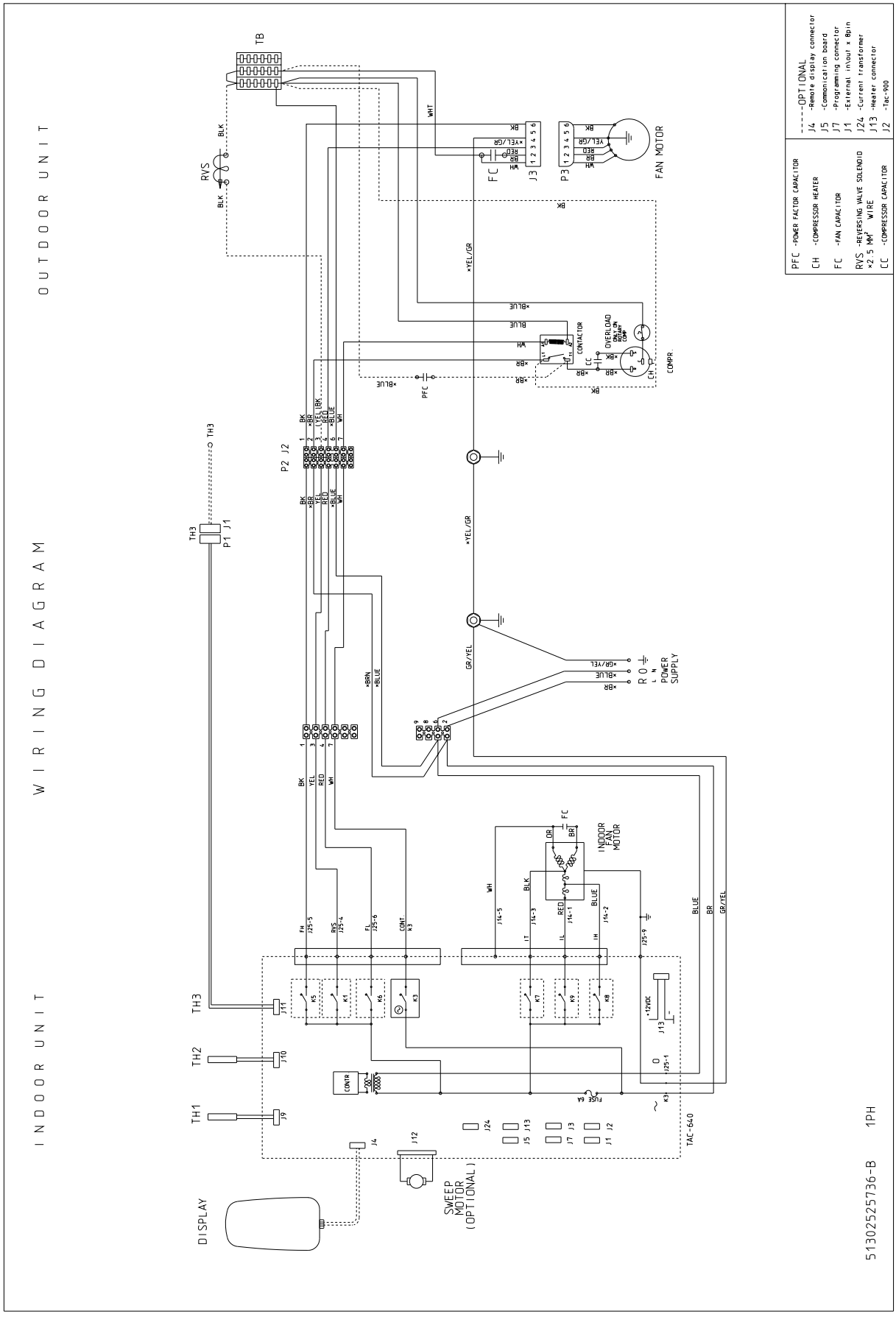
Table 4: Electrical Drawings



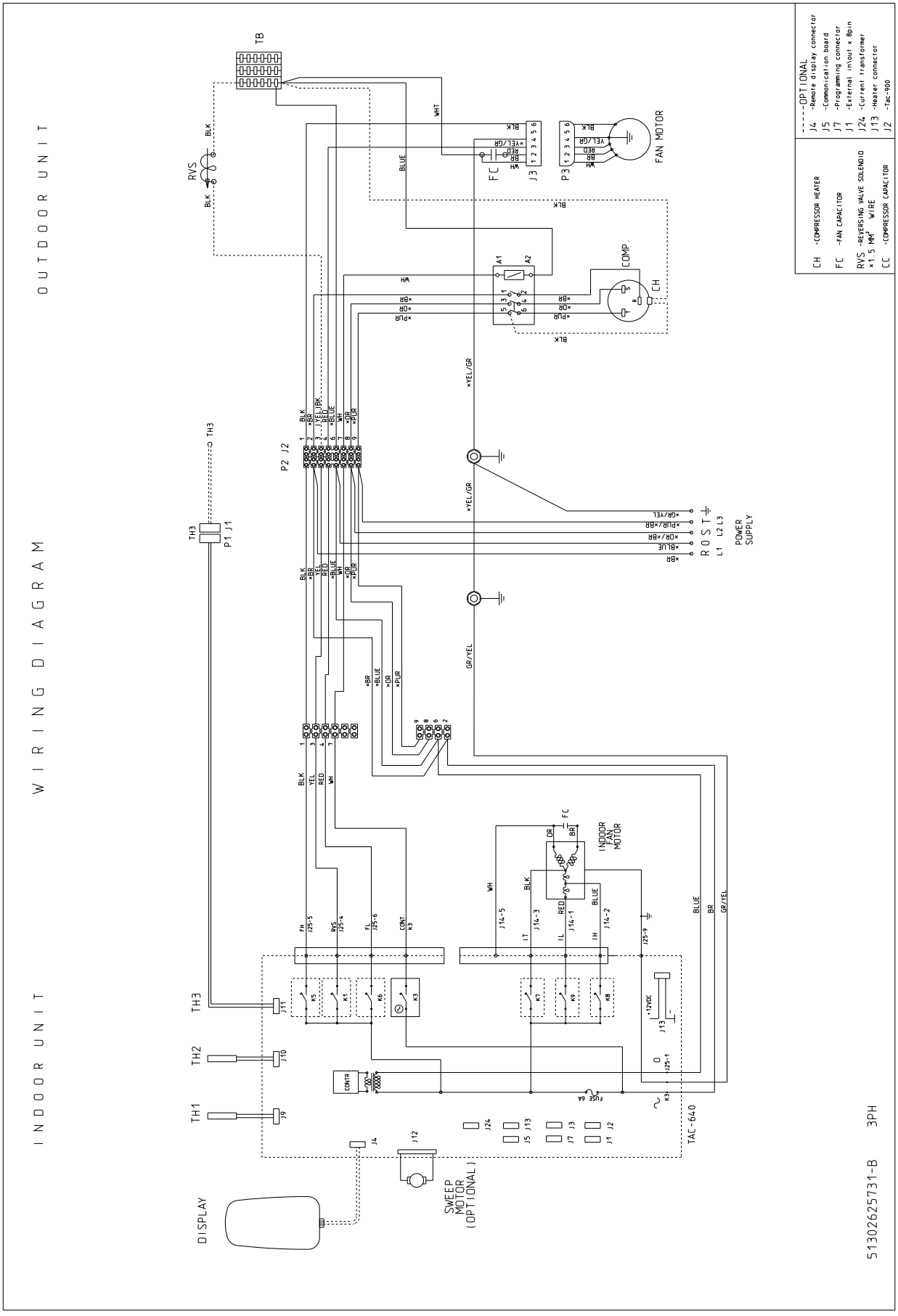
Drawing 1: Electrical Drawing Model TNL 9-25 (1 Phase)



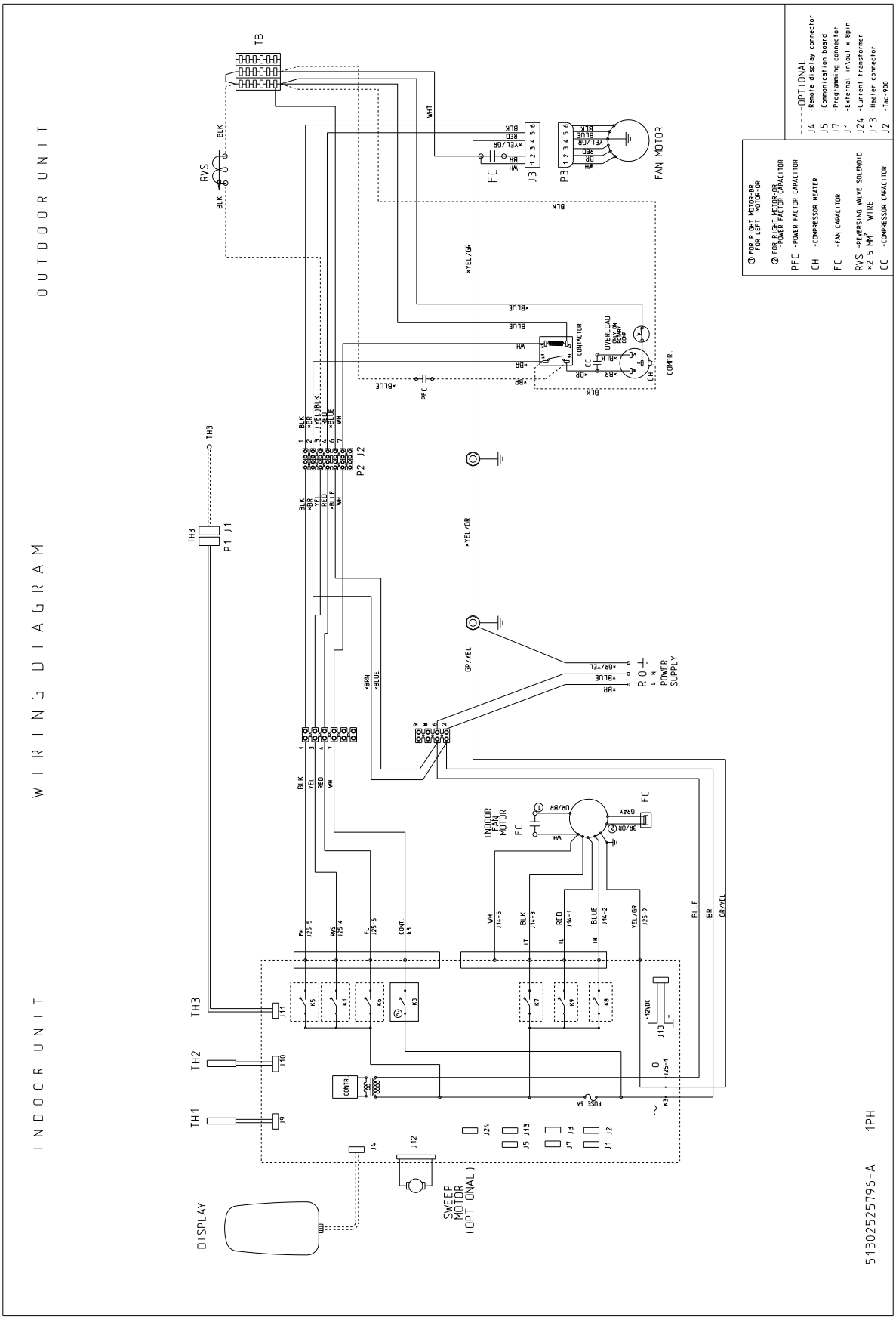
Drawing 2: Electrical Drawing Models DGL 9-20 (1 Phase)



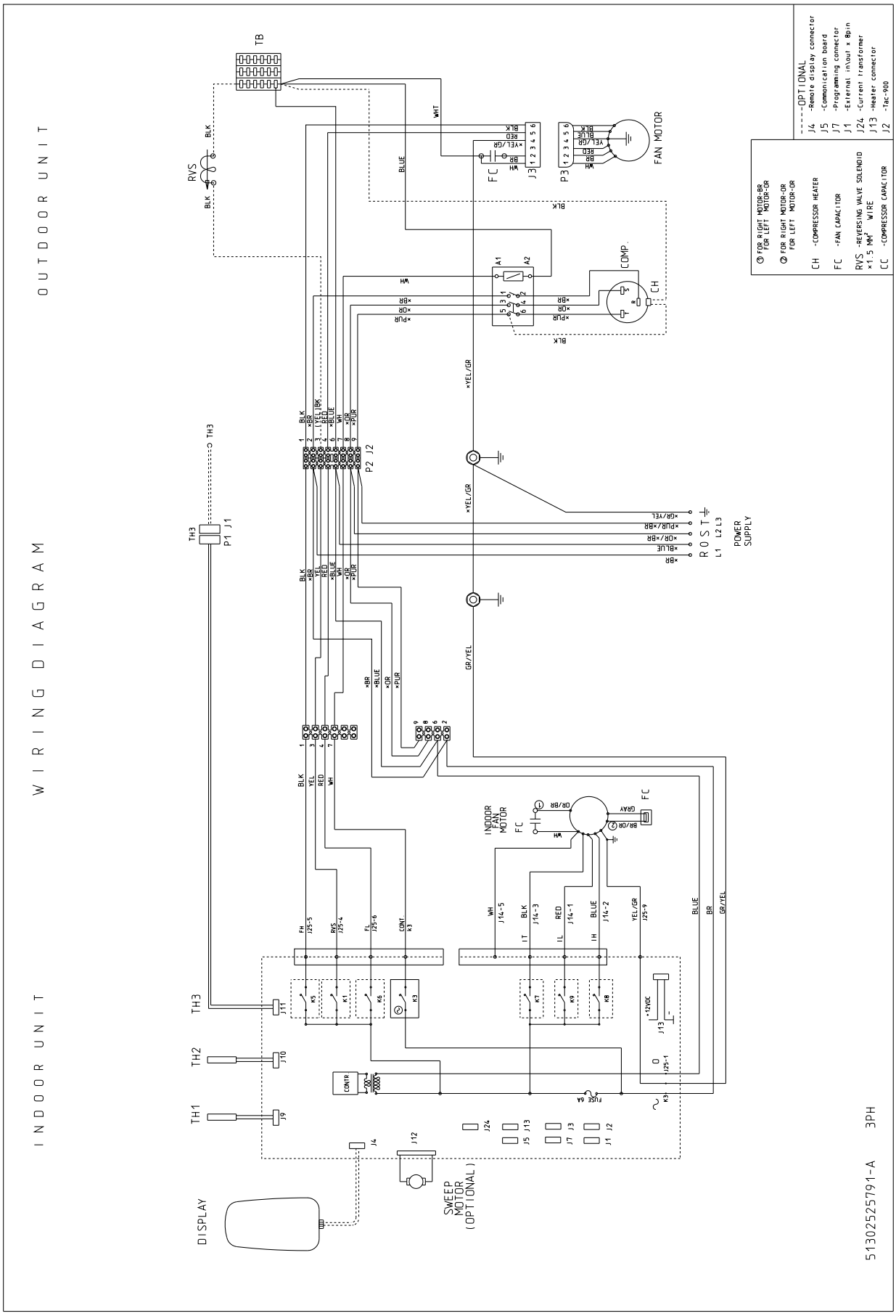
Drawing 3: Electrical Drawing Model TNL, AVL, GCL (1 Phase)



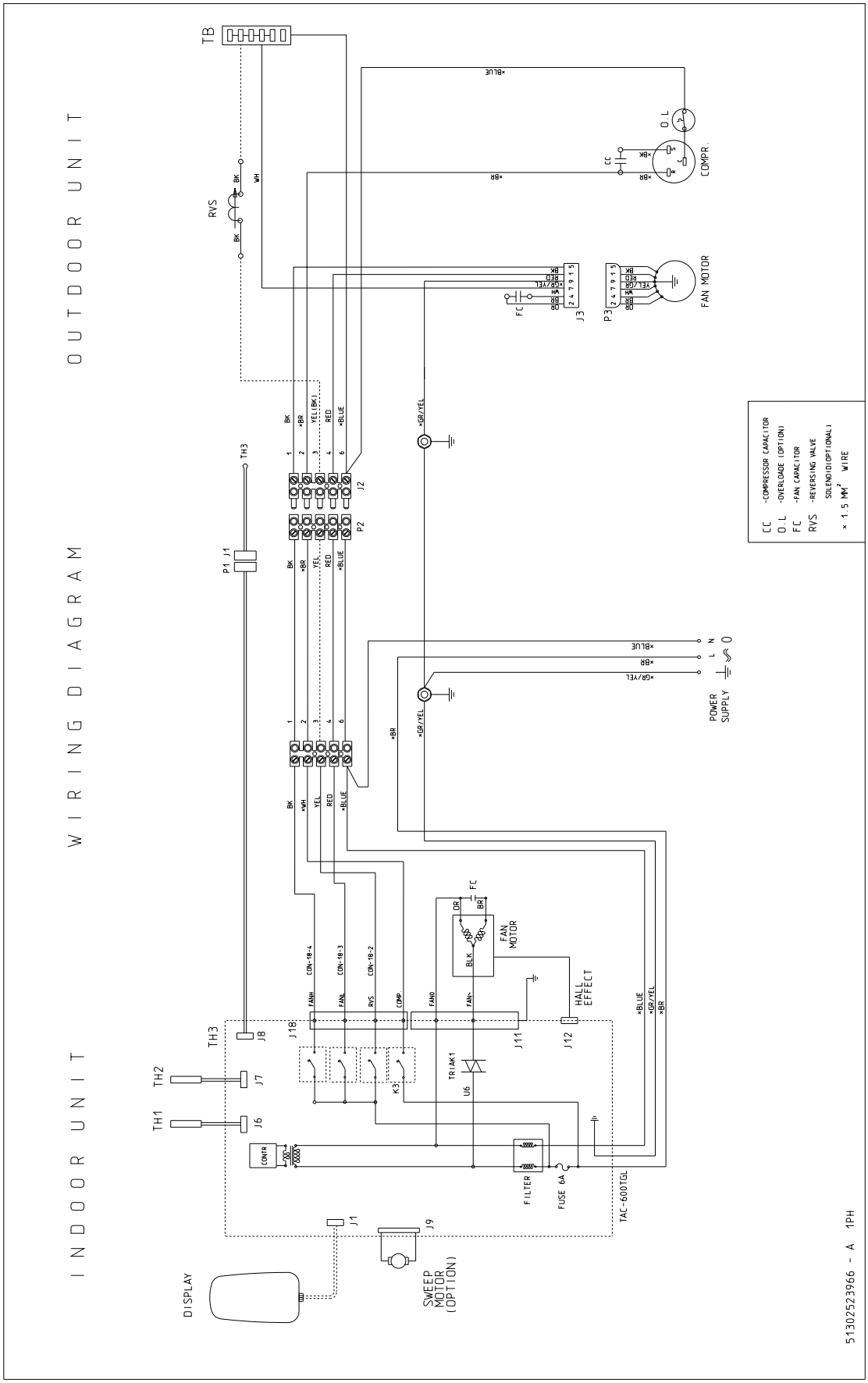
Drawing 4: Electrical Drawing Model AVL, TNL (3 Phase)



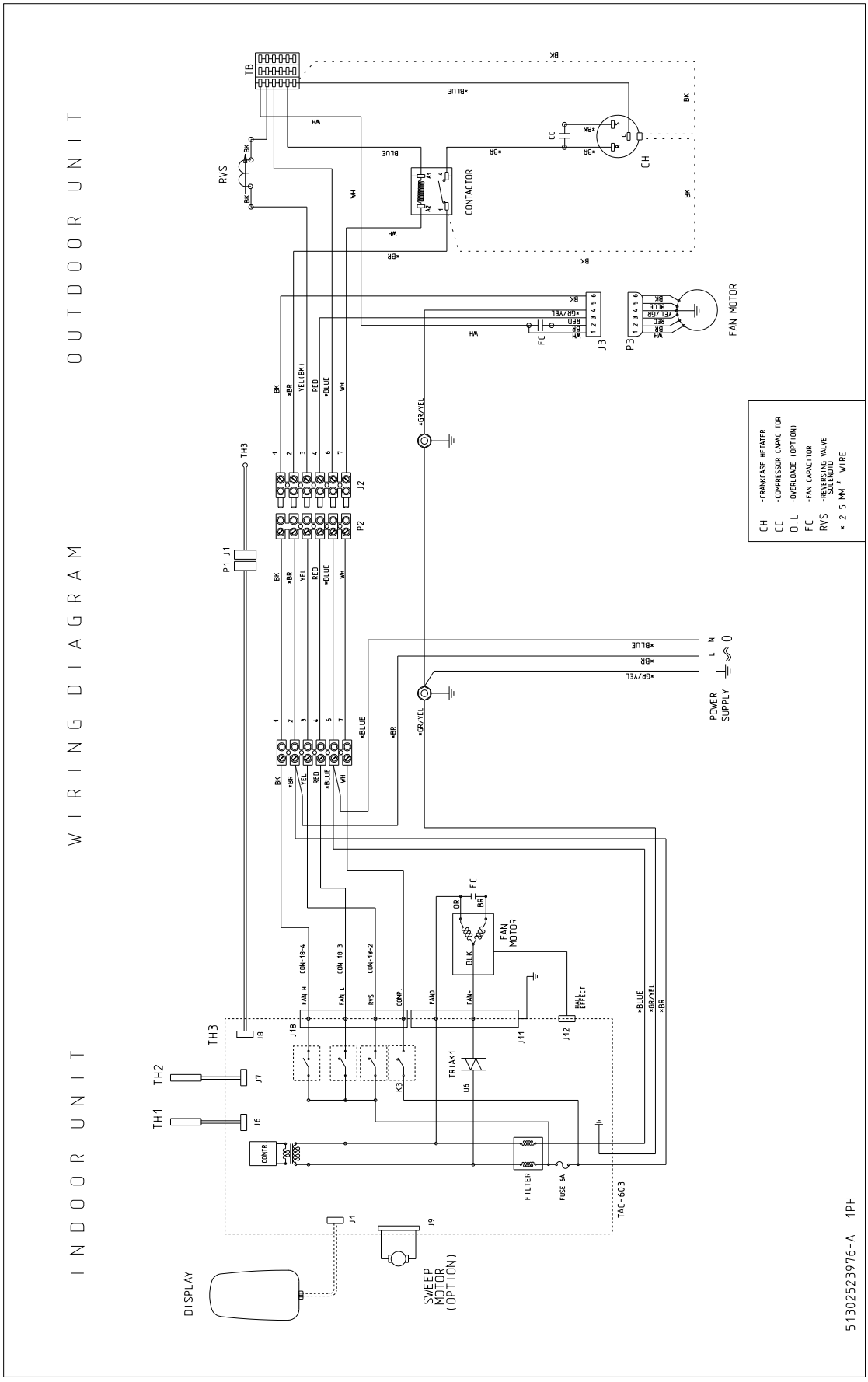
Drawing 5: Electrical Drawing Model ANL (1 Phase)



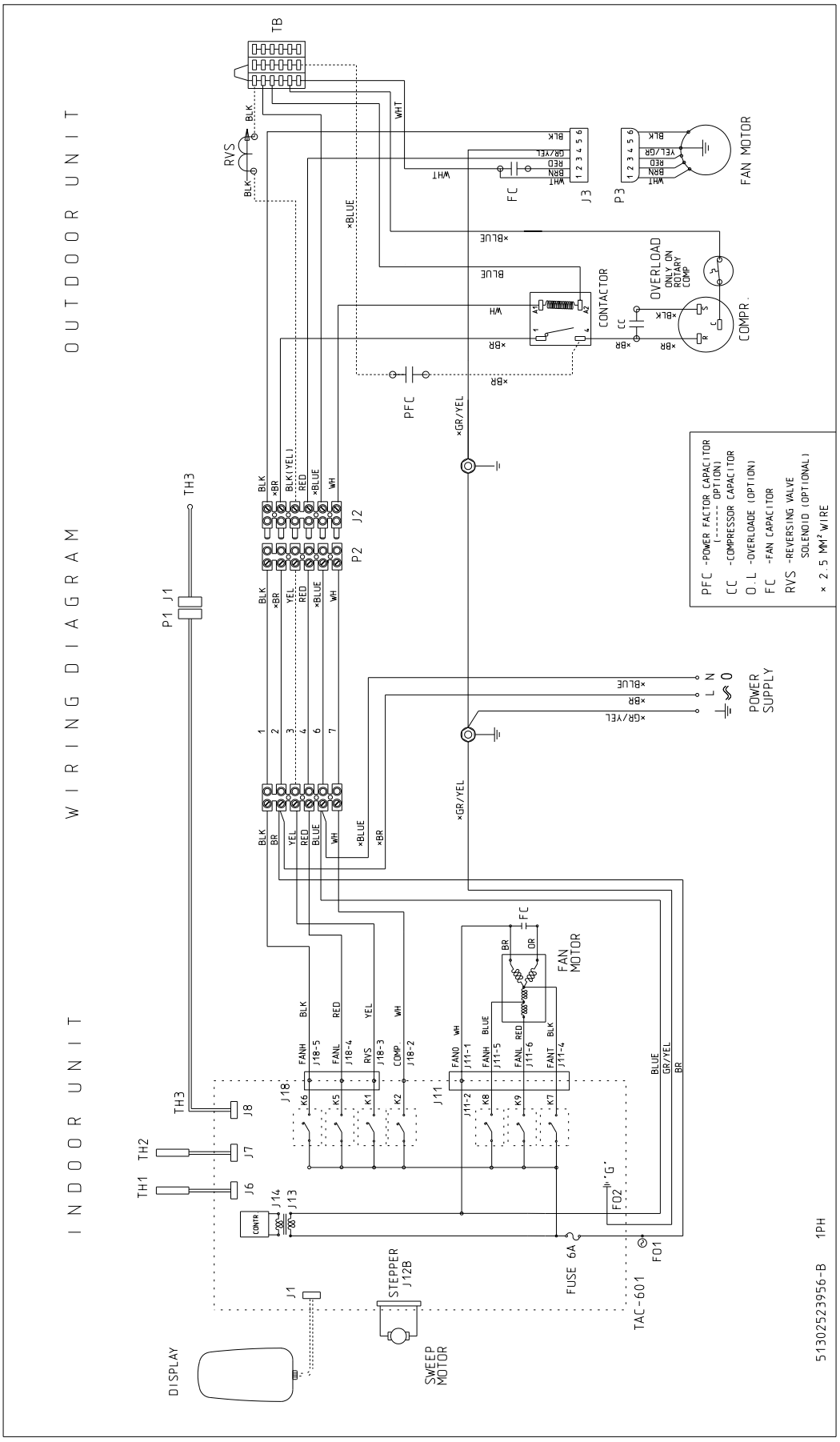
Drawing 6: Electrical Drawing Model ANL-S 50-75 (3 Phase)



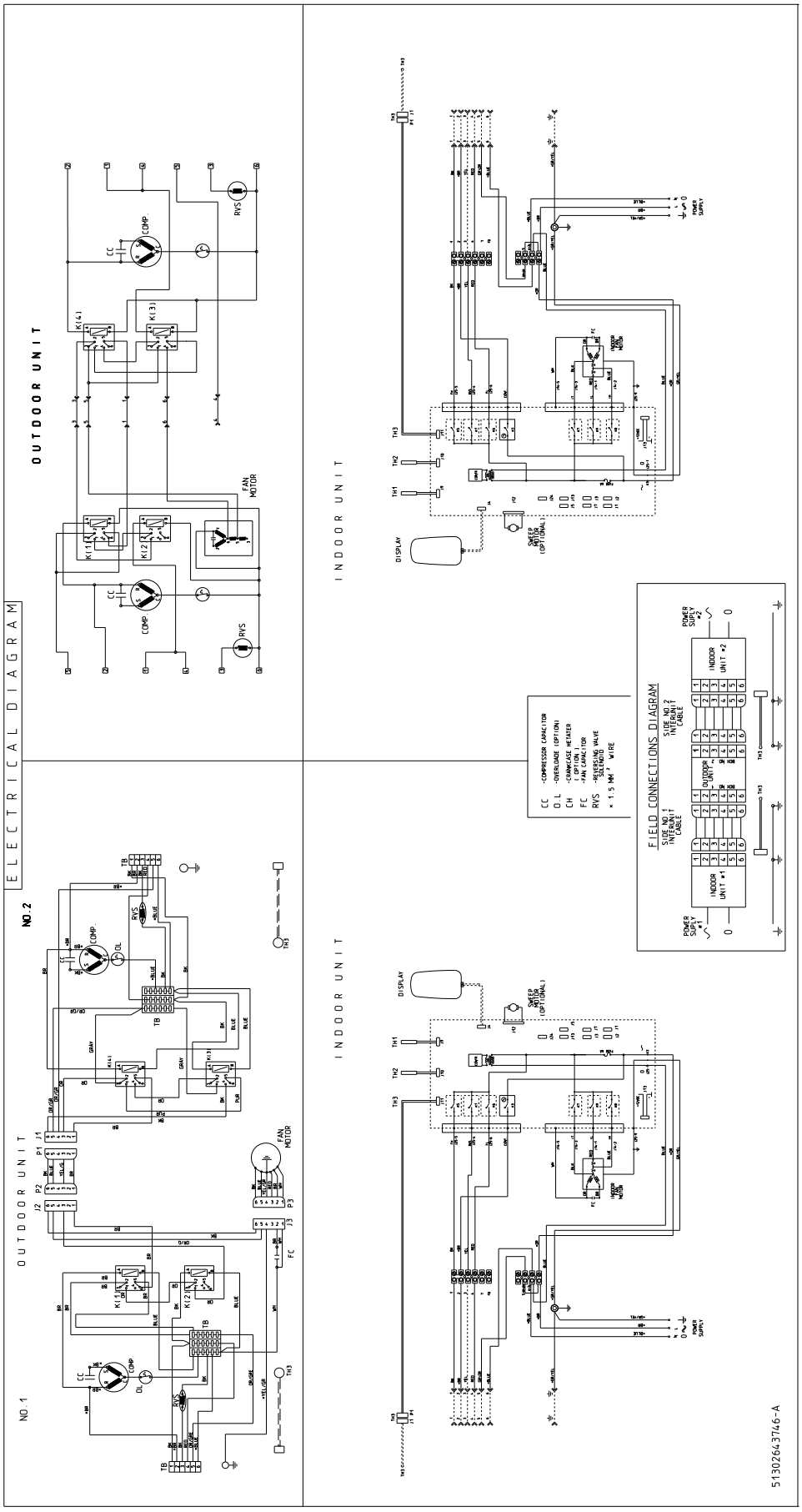
Drawing 7: Electrical Drawing Model TGL 9-25 (1 Phase)



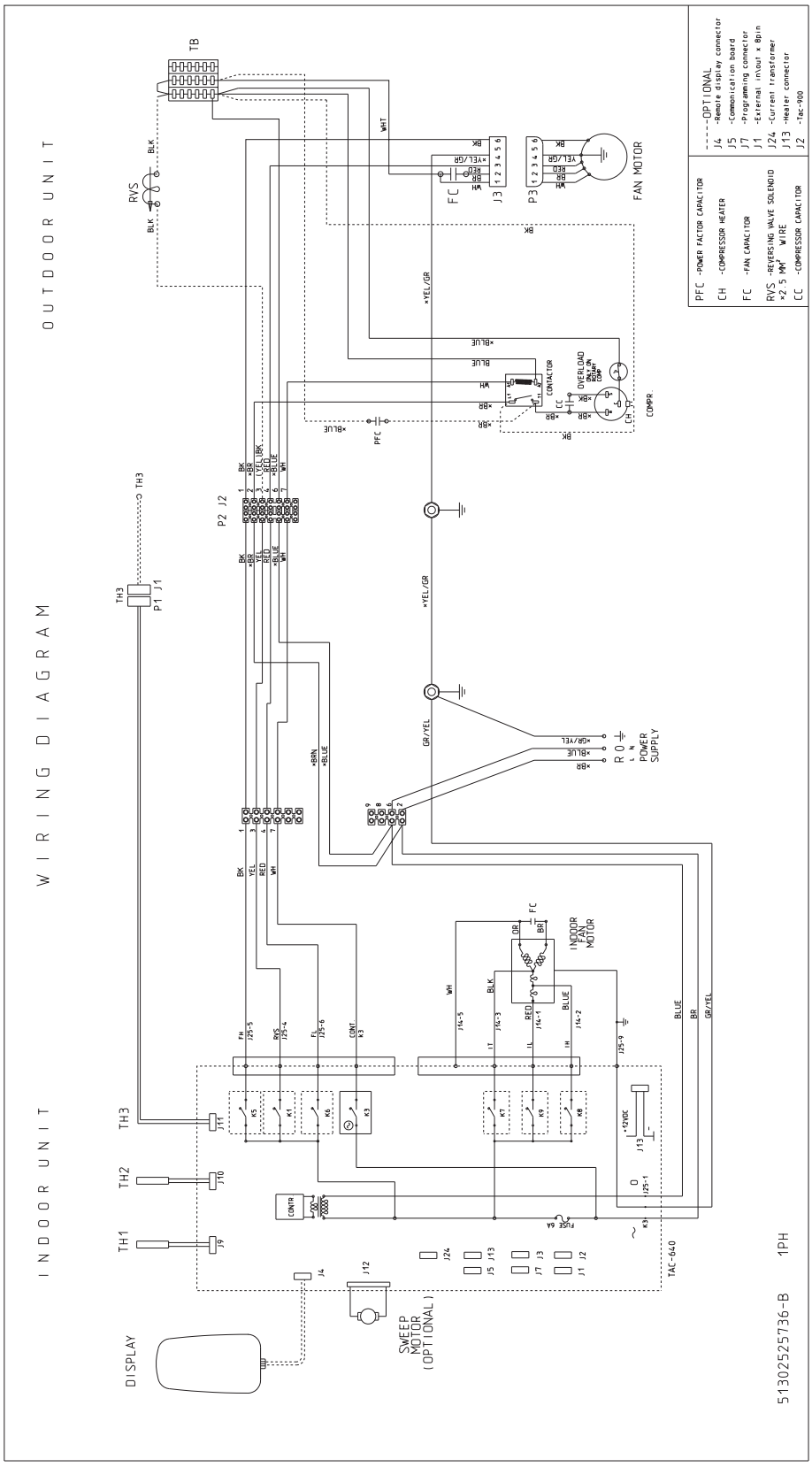
Drawing 8: Electrical Drawing Model TGL 30 (1 Phase)



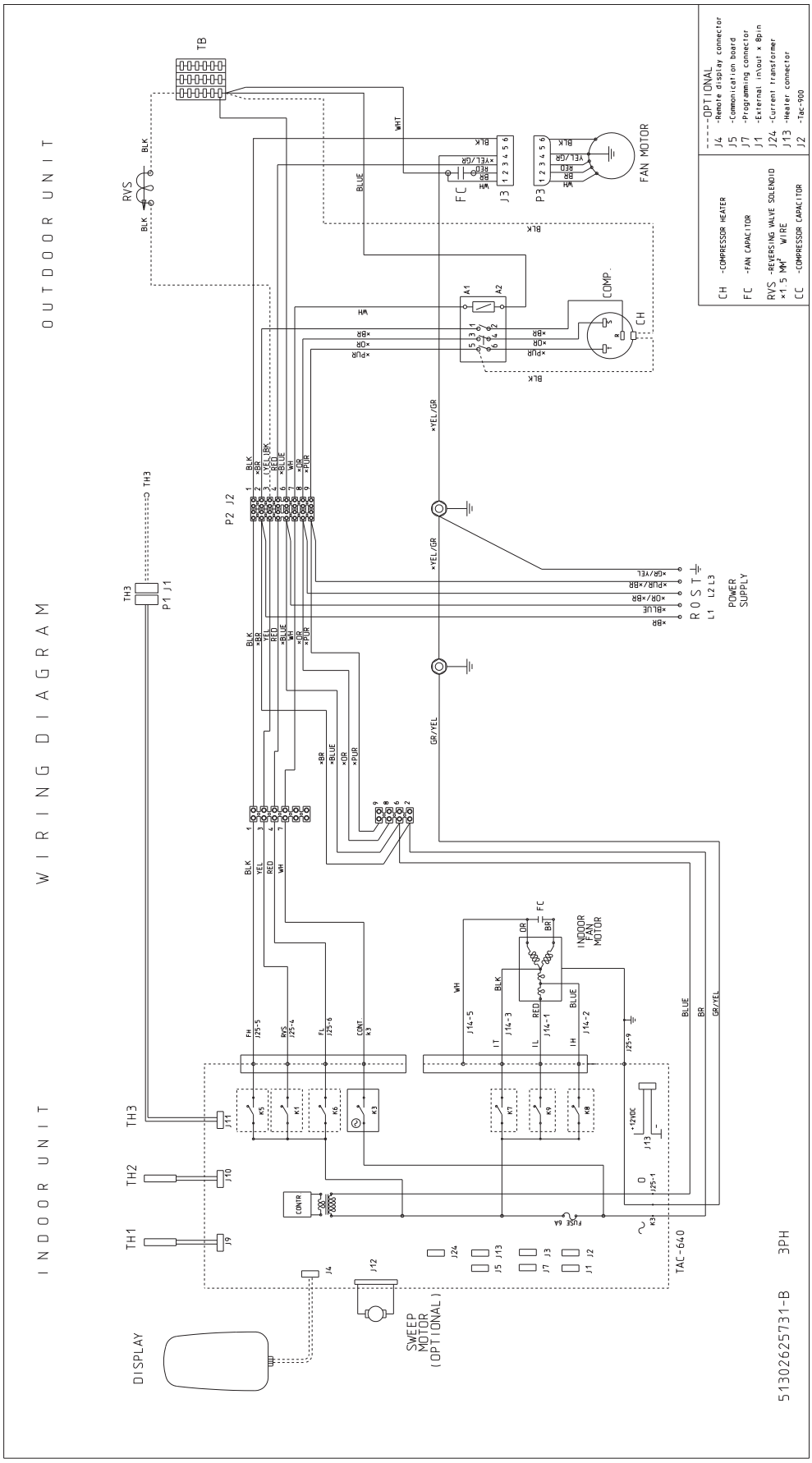
Drawing 9: Electrical Drawing Model TGL 35 (1 Phase)



Drawing 10: Electrical Drawing Model TDL (1 Phase)

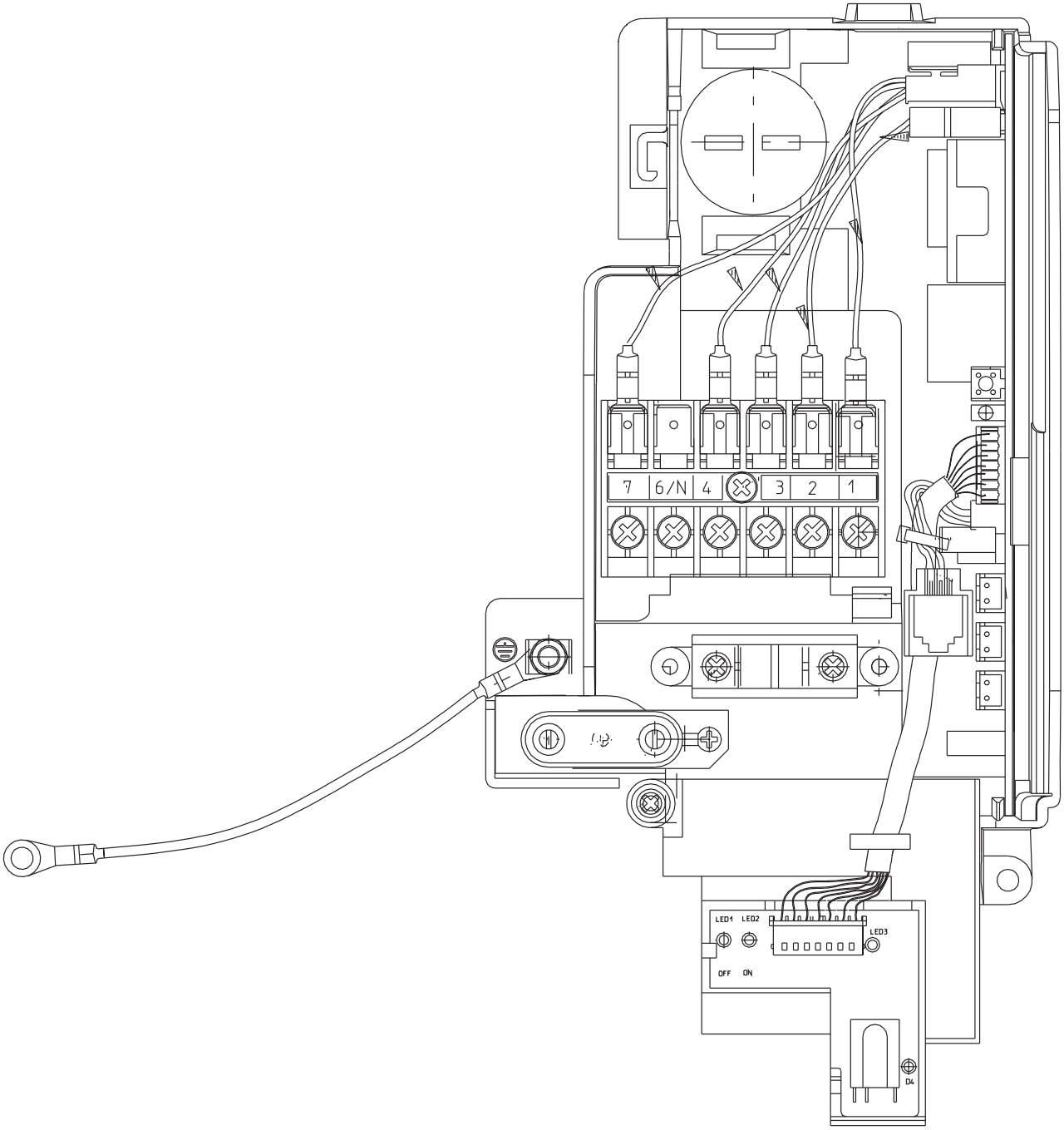


Drawing 11: Electrical Drawing Model GFL (1 Phase)

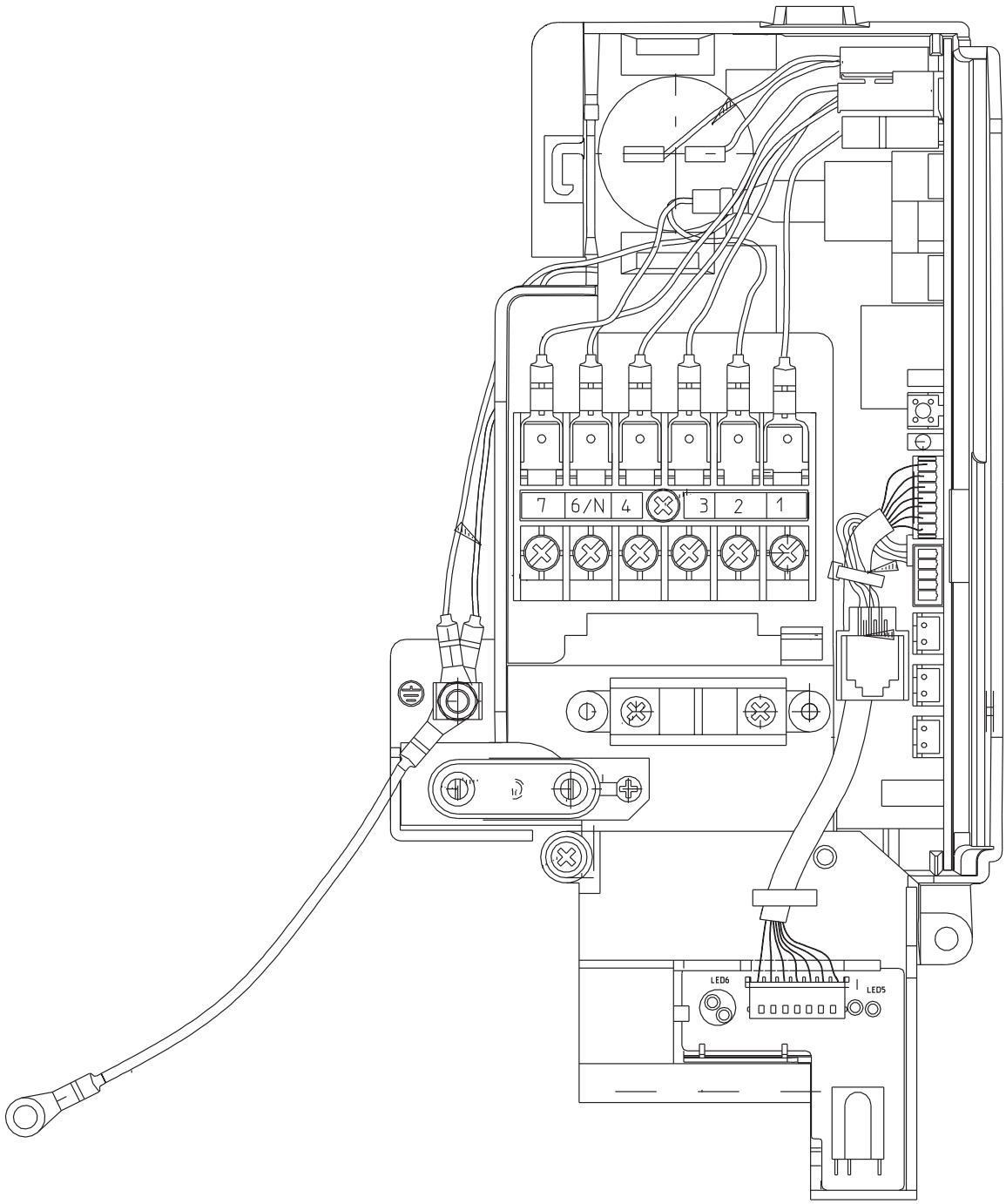


Drawing 12: Electrical Drawing Model GFL (3 Phase)

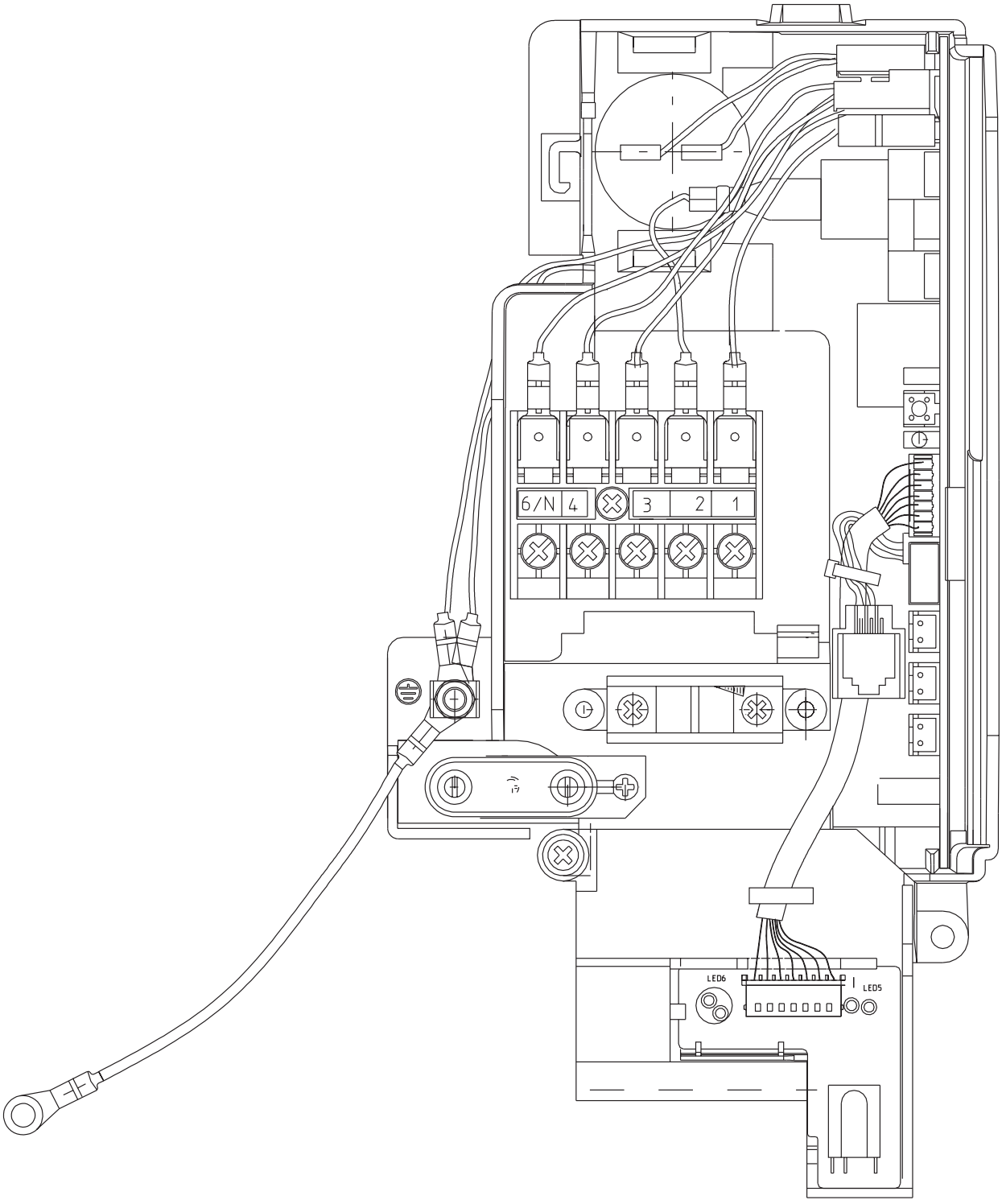
2.4 Outline Drawings



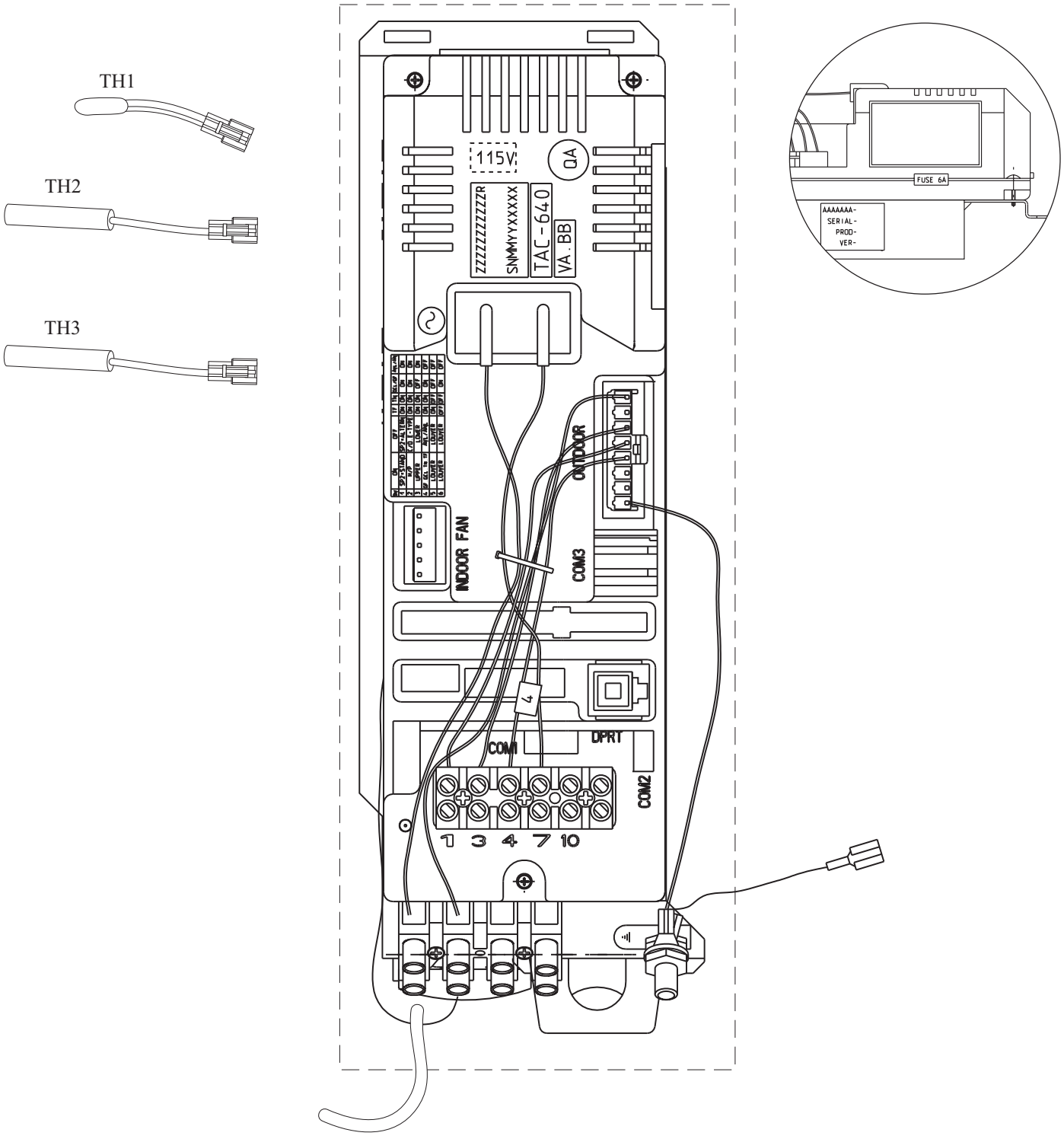
Drawing 13: Outline Drawing Model TAC600TGL



Drawing 14: Outline Drawing Model TAC603

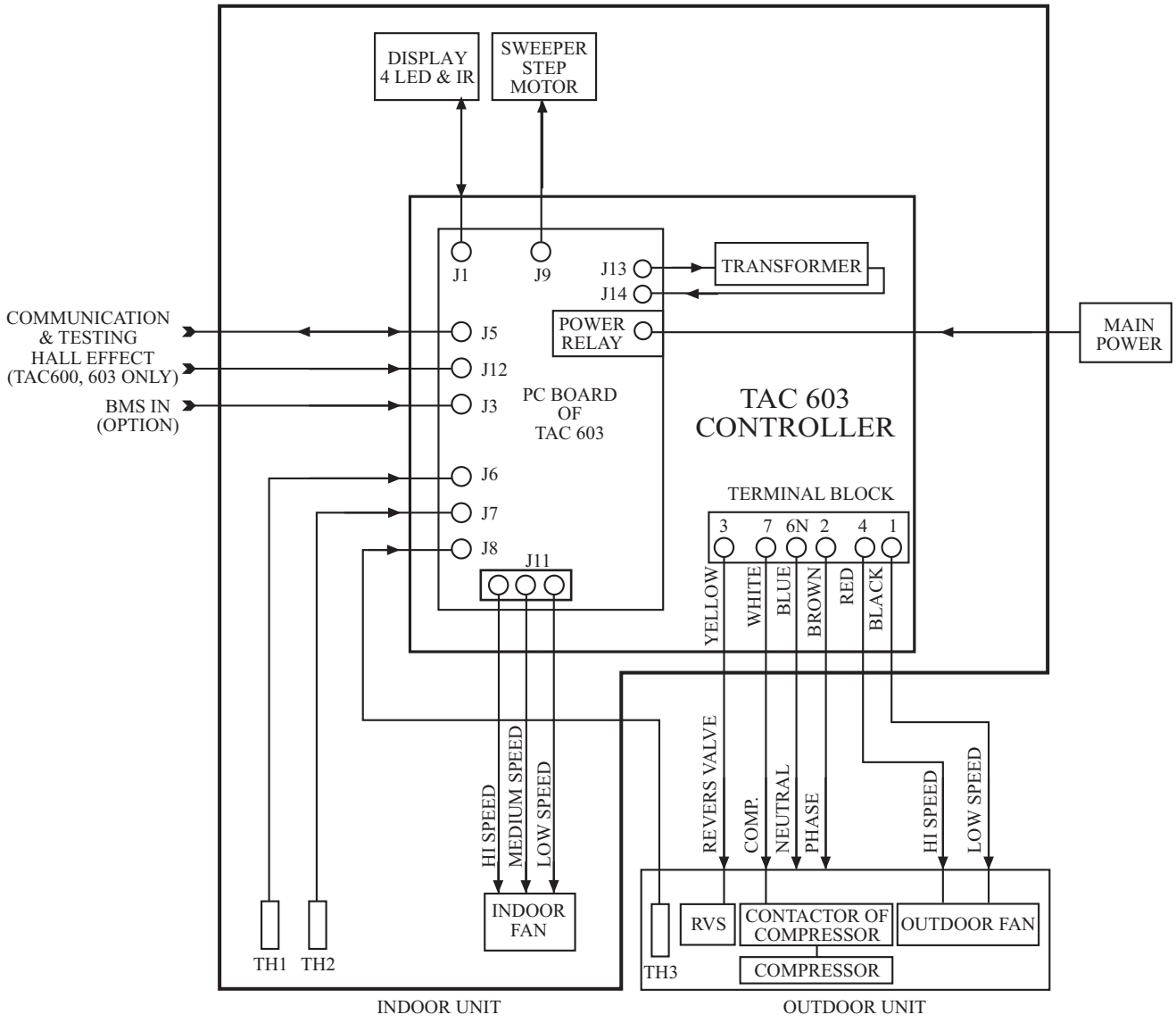


Drawing 15: Outline Drawing Model TAC601

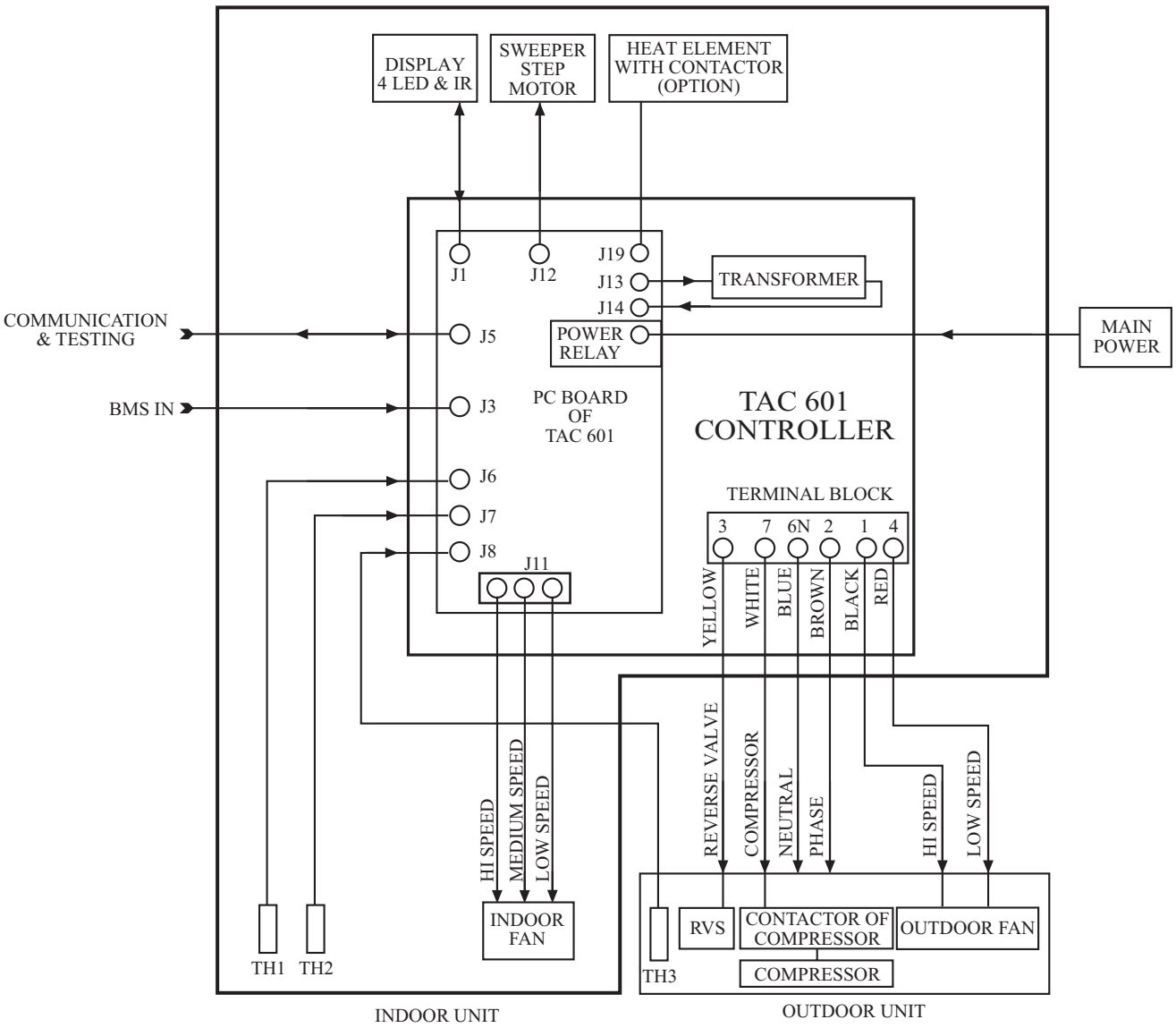


Drawing 16: Outline Drawing Model TAC640

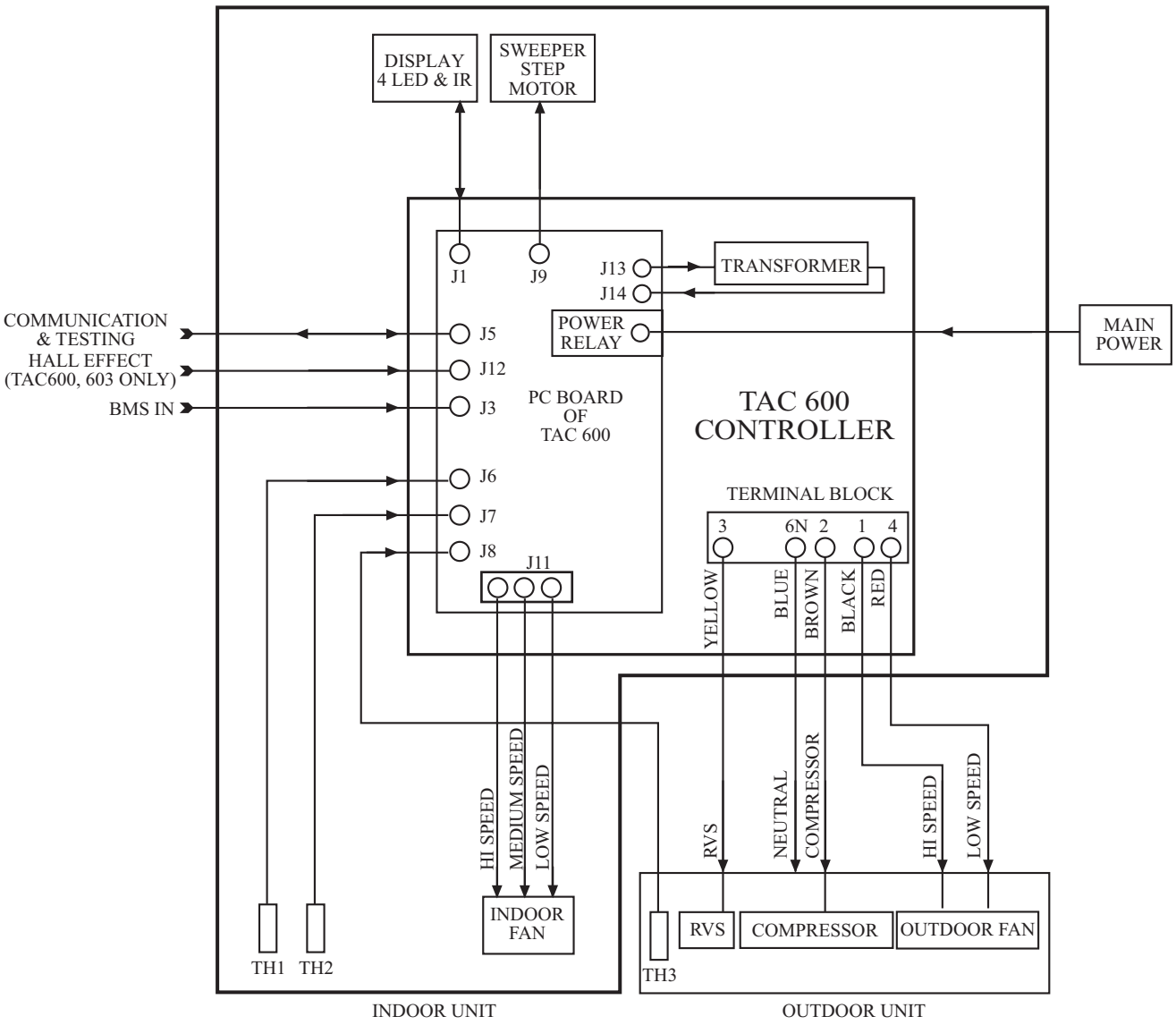
2.5 Control Unit Block Diagram



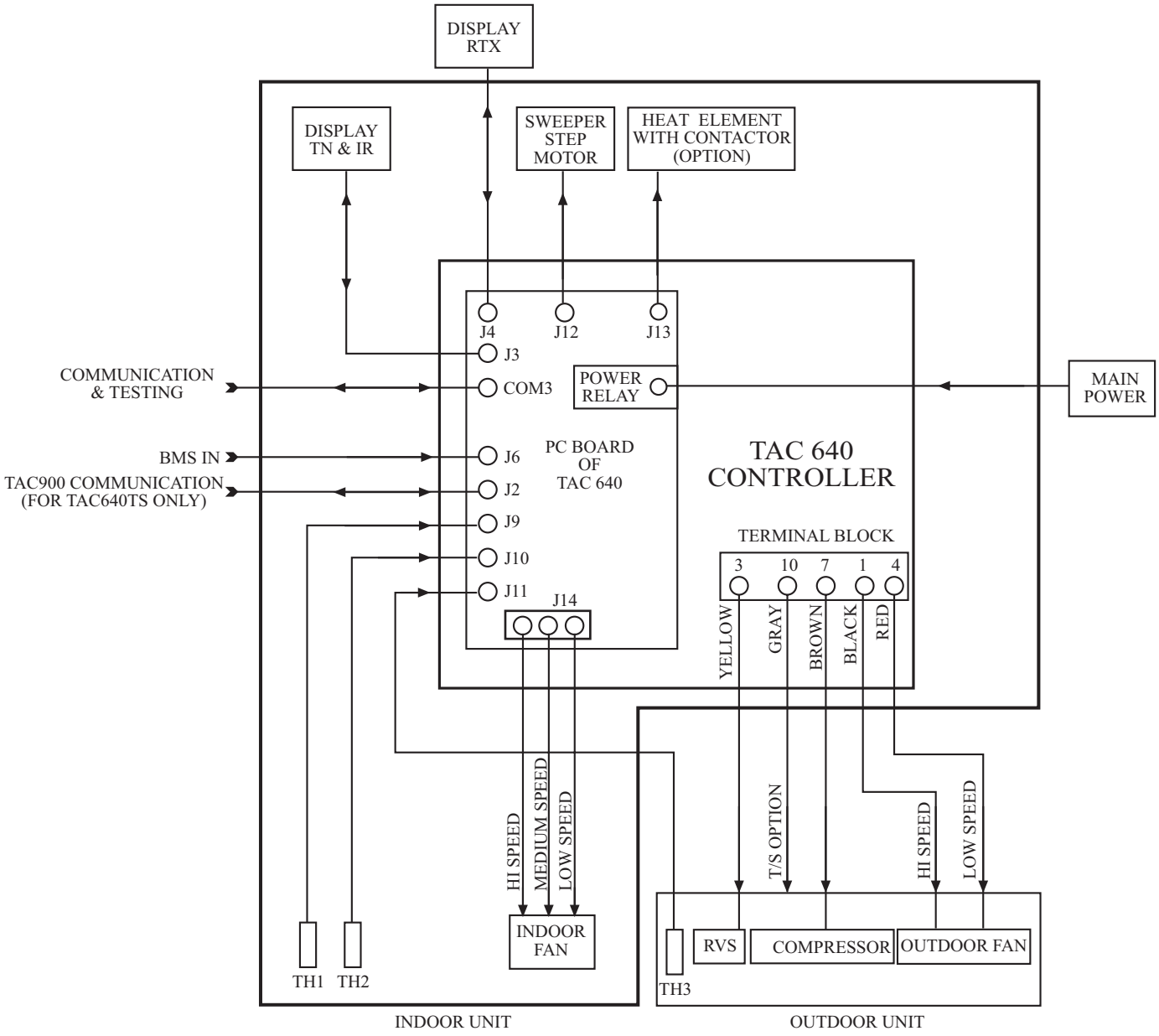
Drawing 17: Block Drawing Model TAC603



Drawing 18: Block Drawing Model TAC601



Drawing 19: Block Drawing Model TAC600



Drawing 20: Block Drawing Model TAC640

2.6 Wiring Connections

Ref. No.	Connection Label	Color/Type	Connects to:	Function
J14	Indoor fan	5 pin jack	Indoor unit fan motor	Controller controls fan speed
J3	DSPLY TN	10 pin jack	4 LED display & IR	Displays mode and status and Infra Red Receiver
J12	Sweep	6 pin jack	Sweeper step motor	Switches sweep feature ON/OFF
J9	TH1	White/2 pin jack	Thermistor (sensor) for air leaving indoor unit (outgoing air vent).	The Controller converts the thermistor output to digital data (temperature) using an 8-bit A/D converter. Controller compares this value to the setpoint.
J10	TH2	Red/2 pin jack	Thermistor (sensor) for Evaporator coil (indoor)	The Controller converts the thermistor outputs to digital data (temperature) using an 8-bit A/D converter.
J11	TH3	Black/2 pin jack	Thermistor (sensor) for Condenser coil (outdoor)	The Controller converts the thermistor outputs to digital data (temperature) using an 8-bit A/D converter.
J4	DSPLY RT	RJ11 socket	Display RJ11 jack	Output to TAC660RTX or TAC660GCL displays
	Terminal block 1 3 4 7 10	 Black Yellow Red Brown or White Gray (option)	 High speed (outdoor fan) Reverse valve (RVS) Low speed (outdoor fan) Compressor (low or high capacity) Twin/Single (T/S) option for TAC 640TS	Terminal block facilitates connections to external wires.
J6	BMS(option)		Building Management System	Building Management System (BMS) can switch OFF the air conditioner from a central location
	COM 3 (option)	RJ11	Tadiran test equipment	Ability to check system functions with external Tadiran test equipment

Table 5: Wiring Connections for TAC640

Ref. No	Connection Label	Color/Type	Connects to:	Function
J11	Indoor fan	5 pin jack	Indoor unit fan motor	Controller controls fan speed.
J9	Sweep	5 pin jack	Sweeper step motor	Switches sweep feature ON/OFF.
J6	TH1	White/2 pin jack	Thermistor (sensor) for air leaving indoor unit.	The Controller converts the thermistor output to digital data (temperature) using an 8-bit A/D converter. Controller compares this value to the setpoint.
J7	TH2	Red/2 pin jack	Thermistor (sensor) for Evaporator coil (indoor)	The Controller converts the thermistor outputs to digital data (temperature) using an 8-bit A/D converter.
J8	TH3	Black/2 pin jack	Thermistor (sensor) for Condenser coil (outdoor)	The Controller converts the thermistor outputs to digital data (temperature) using an 8-bit A/D converter.
J1	DSPLAY	7 pin jack	TAC660RTX or TAC660GCL	Output to TAC660RTX or TAC660GCL displays.
	Terminal block 1 2 2 3 4 6N 7	 Black Brown (600 only) Brown(603 only) Yellow Red Blue White (603 only)	 High speed (outdoor fan) Compressor (low capacity) Main phase to indoor and outdoor units Reverse valve (RVS) Low speed (outdoor fan) Neutral to indoor and outdoor units Contactor of compressor (high capacity)	Terminal block facilitates connections to external wires.
J3	BMS(option)	2 pin jack	Building Management System	Building Management System (BMS) can switch OFF the air conditioner from a central location.
J12	Hall effect	3 pin jack	Indoor fan motor	Receives feedback from fan motor in order to stabilize the motor's operation.
J10		3 pin jack	Indoor fan capacitor	Work capacitor for fan motor
J5		10 pin jack	Tadiran test equipment	Ability to check system functions with external Tadiran test equipment

Table 6: Wiring Connections for TAC600TGL and TAC603

Ref. No.	Connection Label	Color/Type	Connects to:	Function
J11	Indoor fan	6 pin jack	Indoor unit fan motor	Controller controls indoor fan speed
J12	Sweep	6 pin jack	Sweeper step motor	Switches sweep feature ON/OFF
J6	TH1	White/2 pin jack	Thermistor (sensor) for air leaving indoor unit (outgoing air vent).	The Controller converts the thermistor output to digital data (temperature) using an 8-bit A/D converter. Controller compares this value to the setpoint.
J7	TH2	Red/2 pin jack	Thermistor (sensor) for Evaporator coil (indoor)	The Controller converts the thermistor outputs to digital data (temperature) using an 8-bit A/D converter.
J8	TH3	BlackS/2 pin jack	Thermistor (sensor) for Condenser coil (outdoor)	The Controller converts the thermistor outputs to digital data (temperature) using an 8-bit A/D converter.
J1	Display	7 pin jack	4 LED display & IR	Displays mode and status and Infra Red Receiver
	Terminal block 1 2 3 4 6N 7	 Black Brown Yellow Red Blue White	 High speed (outdoor fan) Main phase to indoor and outdoor units Reverse valve (RVS) Low speed (outdoor fan) Neutral to indoor and outdoor units Contactor of the Compressor (high capacity)	Terminal block facilitates connections to external wires.
J3	BMS(option)	2 pin jack	Building Management System	Building Management System (BMS) can switch OFF the air conditioner from a central location
J5		10 pin jack	Tadiran test equipment	Ability to check system functions with external Tadiran test equipment

Table 7: Wiring Connections for TAC601

2.7 DIP Switch Functionality

The following tables list the DIP switch numbers, functions and their factory configuration according to air conditioner model.

DIP No.	Function	ON State	OFF State	TGL-9/11	TGL-15/20	TGL-25/30
SW1	N/A	N/A	N/A	ON	ON	ON
SW2	Heating system	Heat pump	Cool only, E type	ON	ON	ON
SW3	Fan speed	Independent fan speed		OFF	ON	OFF
SW4	Fan speed	Independent fan speed		OFF	OFF	ON

Table 8: TAC-600/3TGL DIP Switch Settings (Factory Configuration)

DIP No.	Function	ON State	OFF State	TN	GF/GCL 350-500	TF	ANL /AVL	GCL 50-250
SW1	SP2	Standard	Alternative	ON	ON	ON	ON	ON
SW2	Heating System	Heat Pump	Cool only, E type					
SW3	AIR CONDITIONER type	Ceiling unit	Floor unit	ON	OFF	ON	ON	OFF
SW4	AIR CONDITIONER model	GF,GCL,TN.TF	AVL, ANL	ON	ON	ON	OFF	ON
SW5	Air sweep (louver)			OFF	OFF	ON	OFF	ON
SW6	Air sweep (louver)			OFF	ON	OFF	OFF	ON

Table 9: TAC-640 DIP Switch Settings (Factory Configuration)

DIP No.	Function	ON State	OFF State	TGL 33/35
SW1	SP2	Standard	Alternative	**ON**
SW2	Heating System	Heat Pump	Cool Only, E Type	**ON**

Table 10: TAC601 DIP Switch Settings (Factory Configuration)

3 Operation Routines

The TAC600 controllers use the same algorithms and enable proper operation of the air conditioner in large range of environmental conditions. The imbedded software controls the air conditioner performance.

3.1 FAN ONLY MODE (Refer to Drawing 74: FAN ONLY MODE ROUTINE (FIG. 12))

3.1.1 Overview:

This is the state the unit is in when the user selects fan mode.

3.1.2 Input:

- User-selected indoor fan speed
- Operating mode

3.1.3 Output:

- Fan mode LED (on TAC660RTX and TAC660GCL)
- Fan speed LED(on TAC660RTX and TAC660GCL)
- Compressor OFF
- Electric heater OFF
- Outdoor fan OFF
- Indoor fan speed Low/High/Turbo
- Reversing valve OFF

3.1.4 Process (Algorithm):

- The indoor fan runs at the user-selected speed, if auto, the fan runs at medium speed
- If the reverse valve is ON, it switches OFF after 120 sec.

3.1.5 Abnormal Conditions and Responses:

None

3.2 COOLING MODE (Refer to Fig. 5)

3.2.1 Overview:

This is the state the unit is in when the user selects cool mode.

3.2.2 Input:

- Cooling Only vs. Heat Pump Configuration
- Room Air Temperature
- User-selected Cooling mode
- Setpoint
- User-selected indoor fan speed

3.2.3 Output:

- Indoor fan speed
- Compressor ON/OFF
- Electric heater OFF
- Outdoor fan speed
- Reversing (four way) valve, ON for first 10 sec. then OFF
- Service LED (on Controller) LED ON/OFF/Flashing/Pulsing

3.2.4 Process (Algorithm):

The system will operate as follows:

1. Compressor OFF
2. Pressure release

- If room temp. is less than setpoint then run Rest Loop until:
  - Room temp. is greater than setpoint or
  - 30 min. has elapsed or
  - Mode changed by user
- If room temp. is greater than setpoint then Compressor ON, run Run Loop until:
  - Room temp. is less than setpoint or
  - Fault occurs (pressure, ice flag, etc.) or
  - Mode changed by user

3.2.5 Abnormal Conditions and Responses:

- Indoor Coil Freeze Protection
- Over/Low Pressure Control
- Indoor Fan Protection
- High/Low Voltage
- Sensor Short or Disconnected

3.3 HEATING MODE (Refer to Drawing 43: HEAT MODE - MAIN (FIG. 6))

3.3.1 Overview:

This is the state the unit is in when the user selects heat mode.

3.3.2 Input:

- Cooling only vs. heat pump configuration
- User selected Heating mode
- Room air temperature
- Setpoint
- User-selected indoor fan speed
- Electric heater configuration

3.3.3 Output:

- Indoor fan speed
- Compressor ON/OFF
- Electric heater ON/OFF
- Outdoor fan speed
- Reversing (four way) valve ON/OFF
- Service LED (on Controller) LED ON/OFF/Flashing/Pulsing

3.3.4 Process (Algorithm):

The system will operate as follows:

1. Compressor OFF
2. Pressure release
   - If room temp. is greater than setpoint then run Rest Loop until:
     - Room temp. is less than setpoint or
     - 20 min. has elapsed or
     - Mode changed by user
   - If room temp. is less than setpoint then Compressor ON, run Run Loop until:
     - Room temp. is greater than setpoint or
     - Fault occurs (pressure, ice flag, etc.) or
     - Mode changed by user

3.3.5 Abnormal Conditions and Responses:

- High/low Voltage
- Over/Low Pressure Control
- De-ice
- Indoor Coil High Temperature Protection
- Sensor Short or Disconnected

3.4 DRY MODE (Refer to Drawing 66: DRY MODE - MAIN (FIG. 9))

3.4.1 Overview:

This is the state the unit is in when the user selects dry mode.

3.4.2 Input:

- Operating Mode
- Setpoint
- User-selected Dry mode
- Room Air Temperature

3.4.3 Output:

- Low Indoor Fan Speed
- Compressor ON/OFF
- Outdoor fan speed
- Reversing (four way) valve, ON for first 10 sec. then OFF
- Power LED ON/OFF/Flashing
- Service LED (on Controller) LED ON/OFF/Flashing/Pulsing

3.4.4 Process (Algorithm):

When the operating mode is Dry, the unit operates the same as Cool mode except:

- The Indoor fan always runs at low speed.

3.4.5 Abnormal Conditions and Responses:

- Indoor Coil Freeze Protection
- Over/Low Pressure Control
- Indoor Fan Protection
- High/Low Voltage
- Sensor Short or Disconnected

3.5 AUTO MODE

3.5.1 Overview:

This is the state the unit is in when the user selects Auto mode.

3.5.2 Input:

- Cooling Only vs. Heat Pump Configuration
- Room Air Temperature
- User-selected Auto mode
- Setpoint
- User-selected indoor fan speed

3.5.3 Output:

- Indoor fan speed
- Compressor ON/OFF
- Electric heater ON/OFF
- Outdoor fan speed
- Reversing (four way) valve ON/OFF
- Service LED (on Controller) LED ON/OFF/Flashing/Pulsing

3.5.4 Process (Algorithm):

The system will operate as follows:

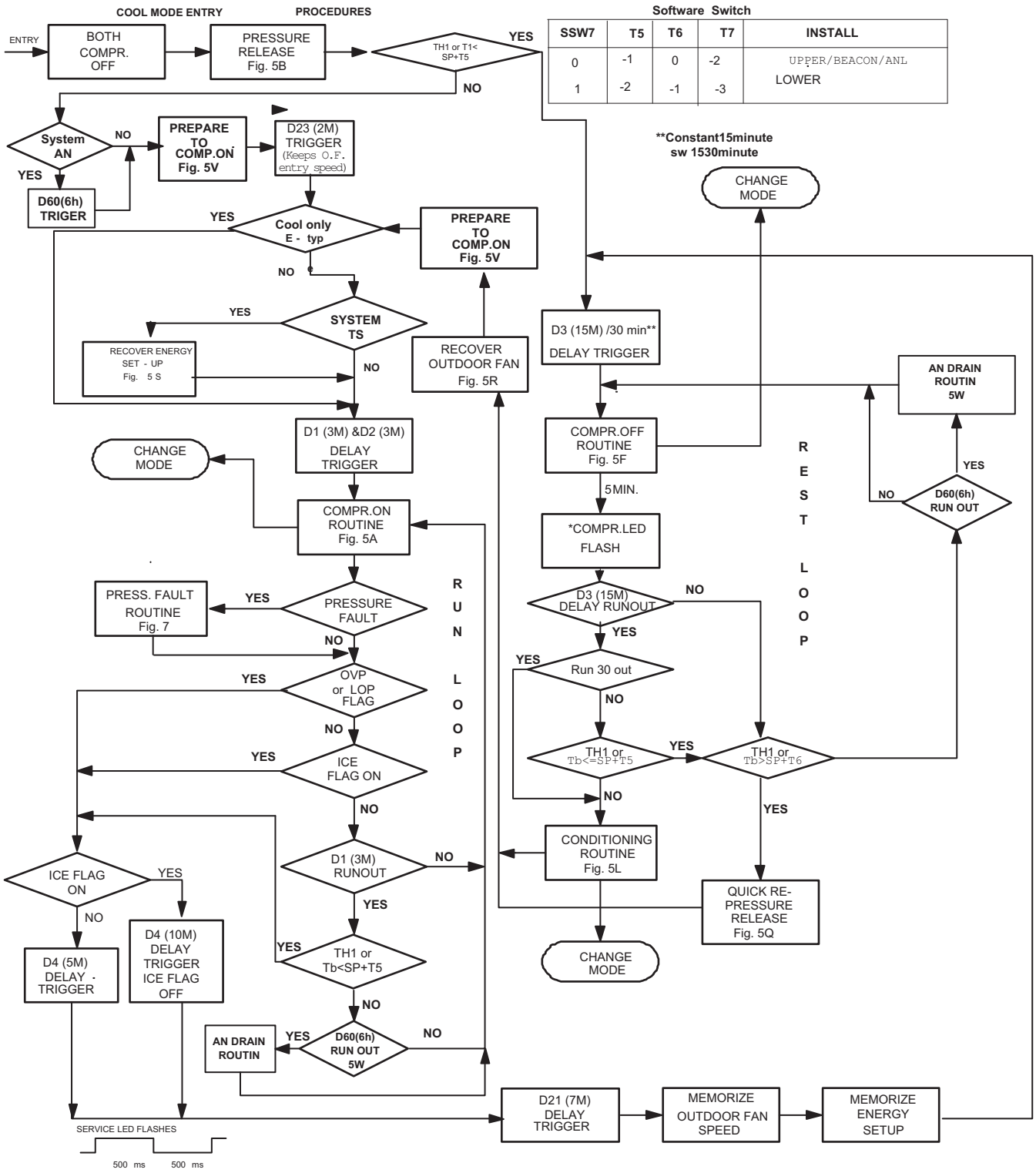
While in Auto mode the system works only in:

- Cooling mode when room temperature is above* the setpoint
- Heating mode when room temperature is below* the setpoint.
- Rest Loop when room temperature is equal* the setpoint

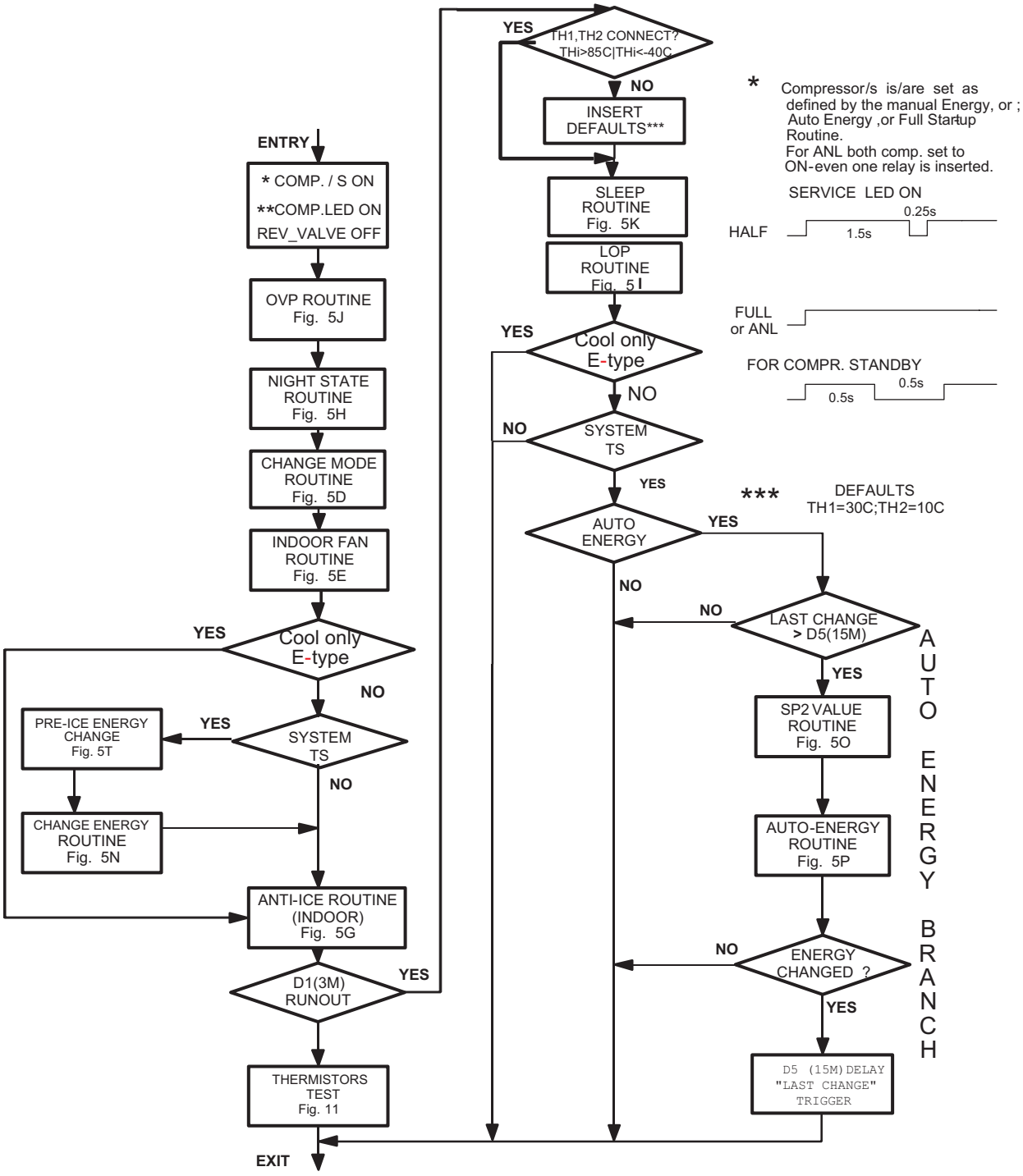
*See Flowcharts for temperature range

3.5.5 Abnormal Conditions and Responses:

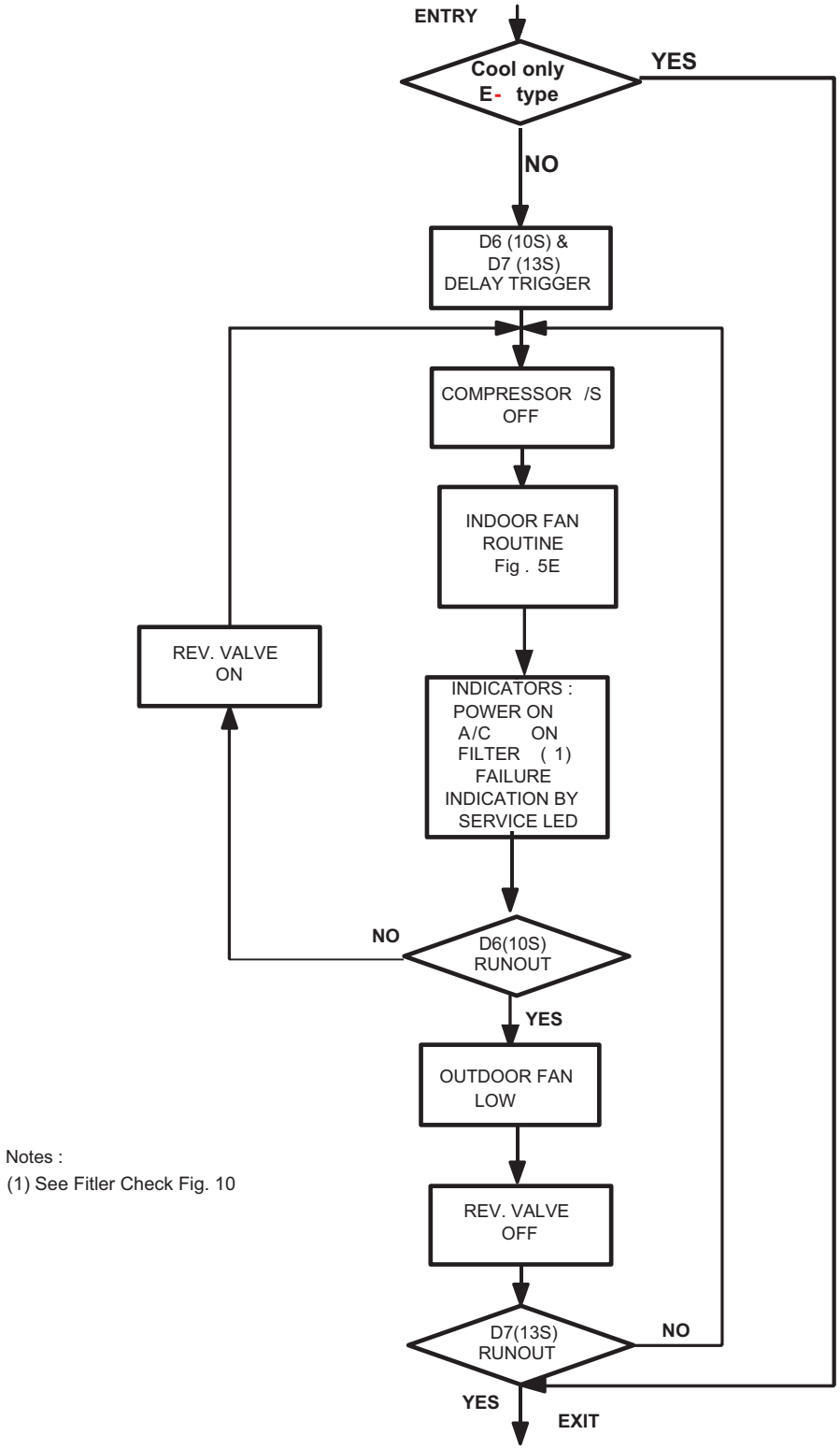
- Indoor Coil Freeze Protection
- Over/Low Pressure Control
- Indoor Fan Protection
- High/Low Voltage
- Sensor Short or Disconnected



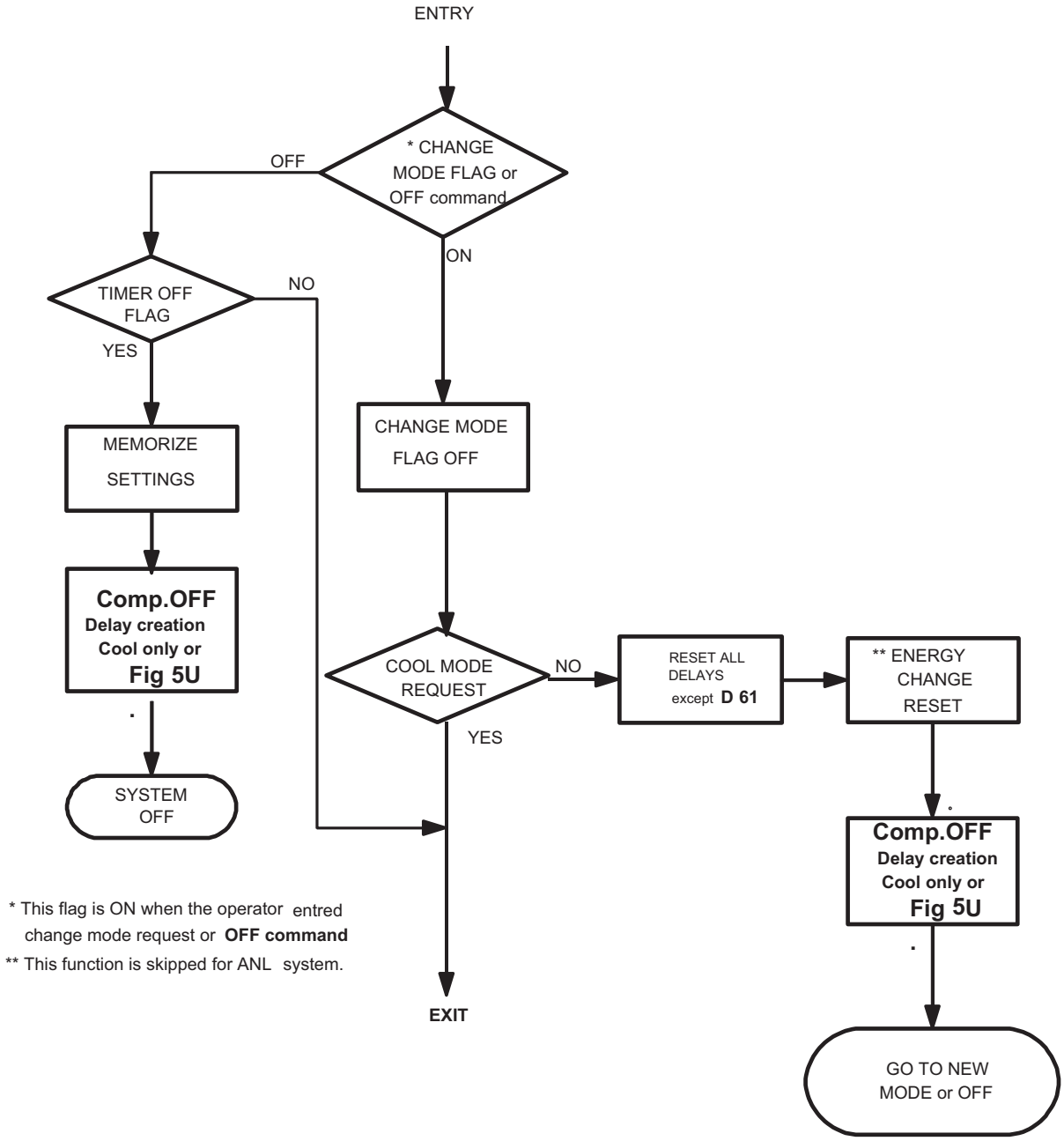
Drawing 21: COOL MODE MAIN (FIG. 5)



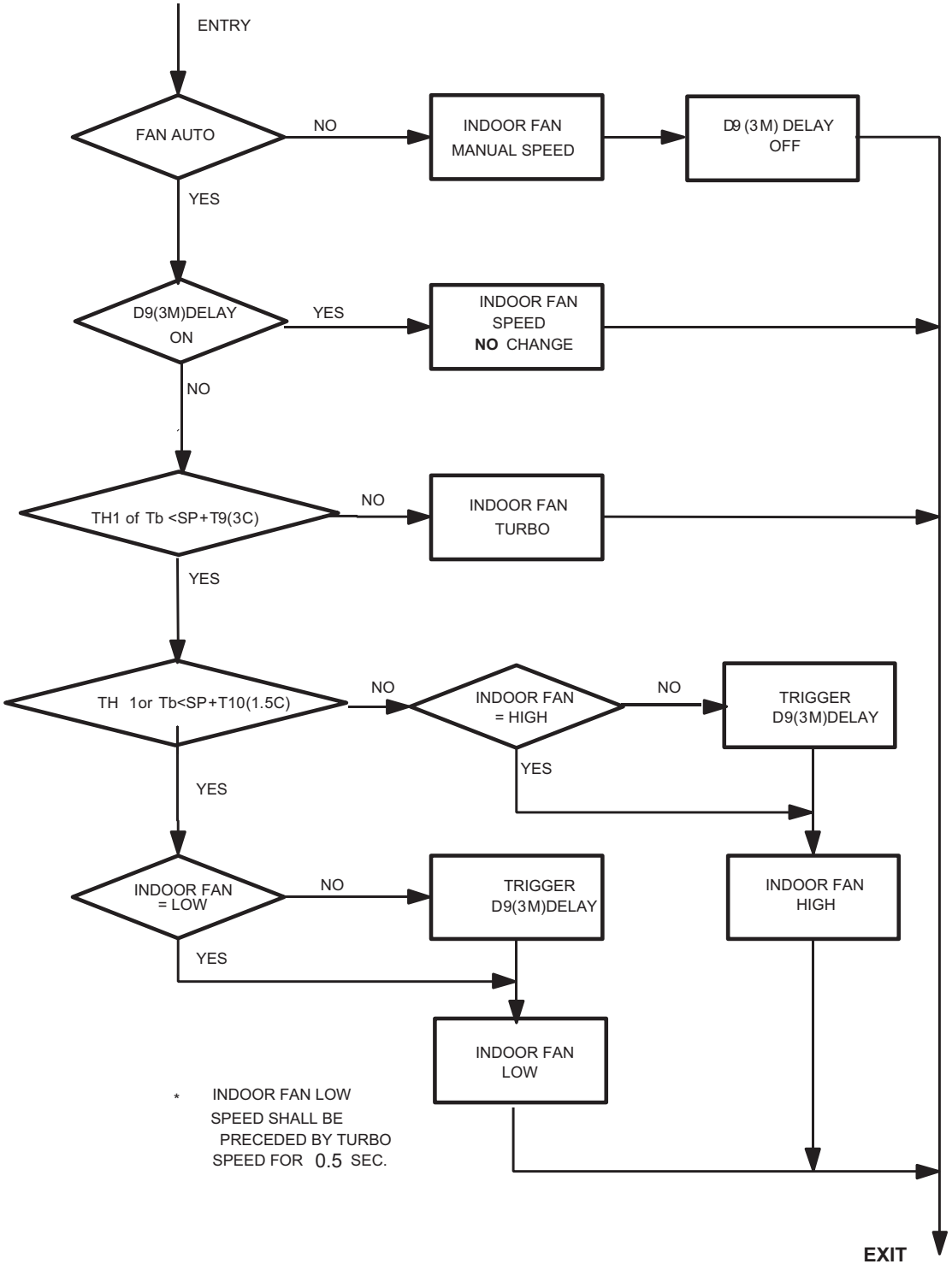
Drawing 22: COMPRESSOR ON ROUTINE - COOL MODE (FIG. 5A)



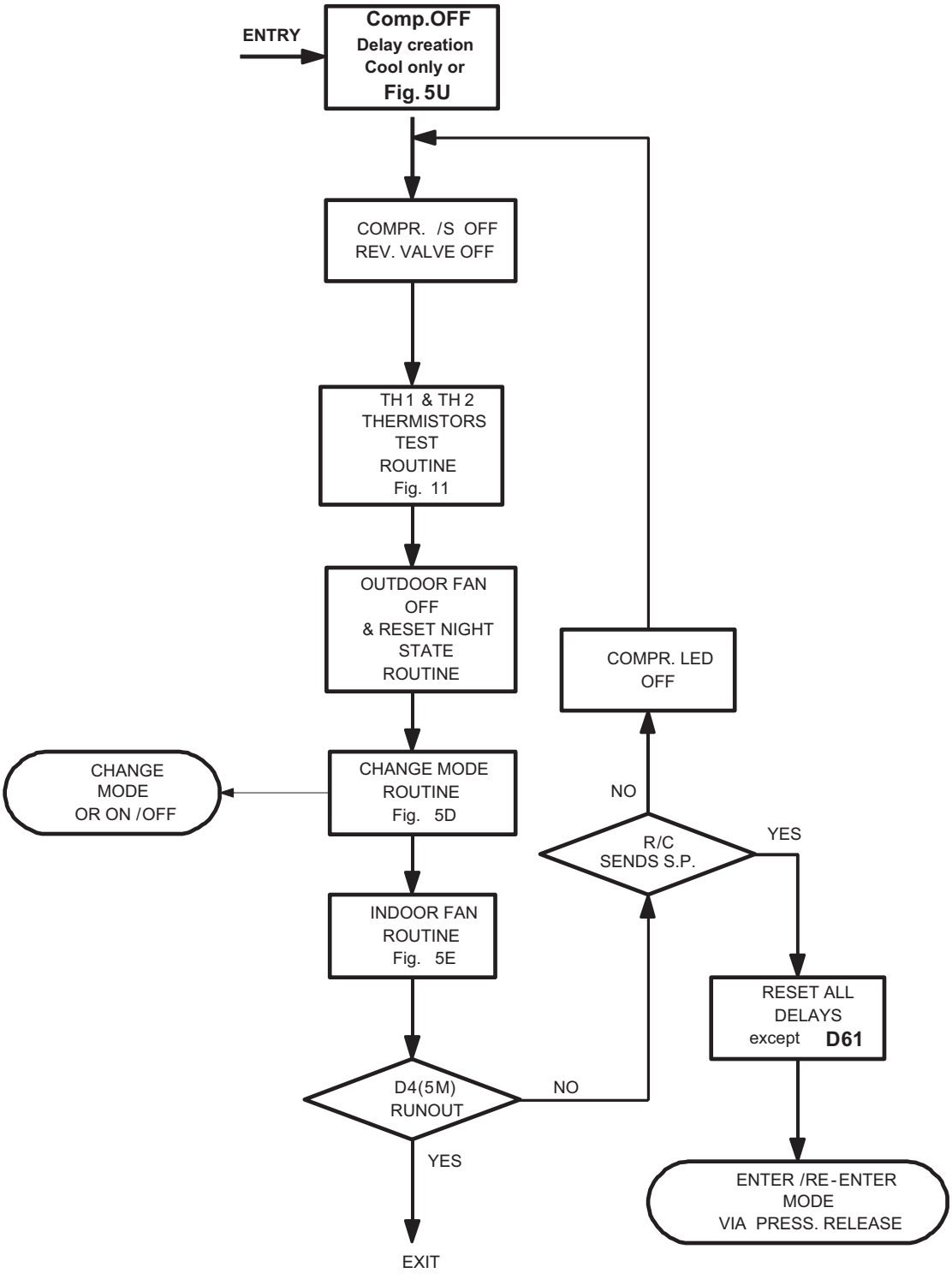
Drawing 23: COOL MODE PRESSURE RELEASE ROUTINE (FIG. 5B)


ENTRY
* CHANGE MODE FLAG or OFF command
OFF
ON
TIMER OFF FLAG
NO
YES
MEMORIZE SETTINGS
CHANGE MODE FLAG OFF
Comp.OFF Delay creation Cool only or Fig 5U
COOL MODE REQUEST
NO
RESET ALL DELAYS except D 61
** ENERGY CHANGE RESET
YES
SYSTEM OFF
Comp.OFF Delay creation Cool only or Fig 5U
GO TO NEW MODE or OFF
EXIT
* This flag is ON when the operator entred change mode request or OFF command
** This function is skipped for ANL system.

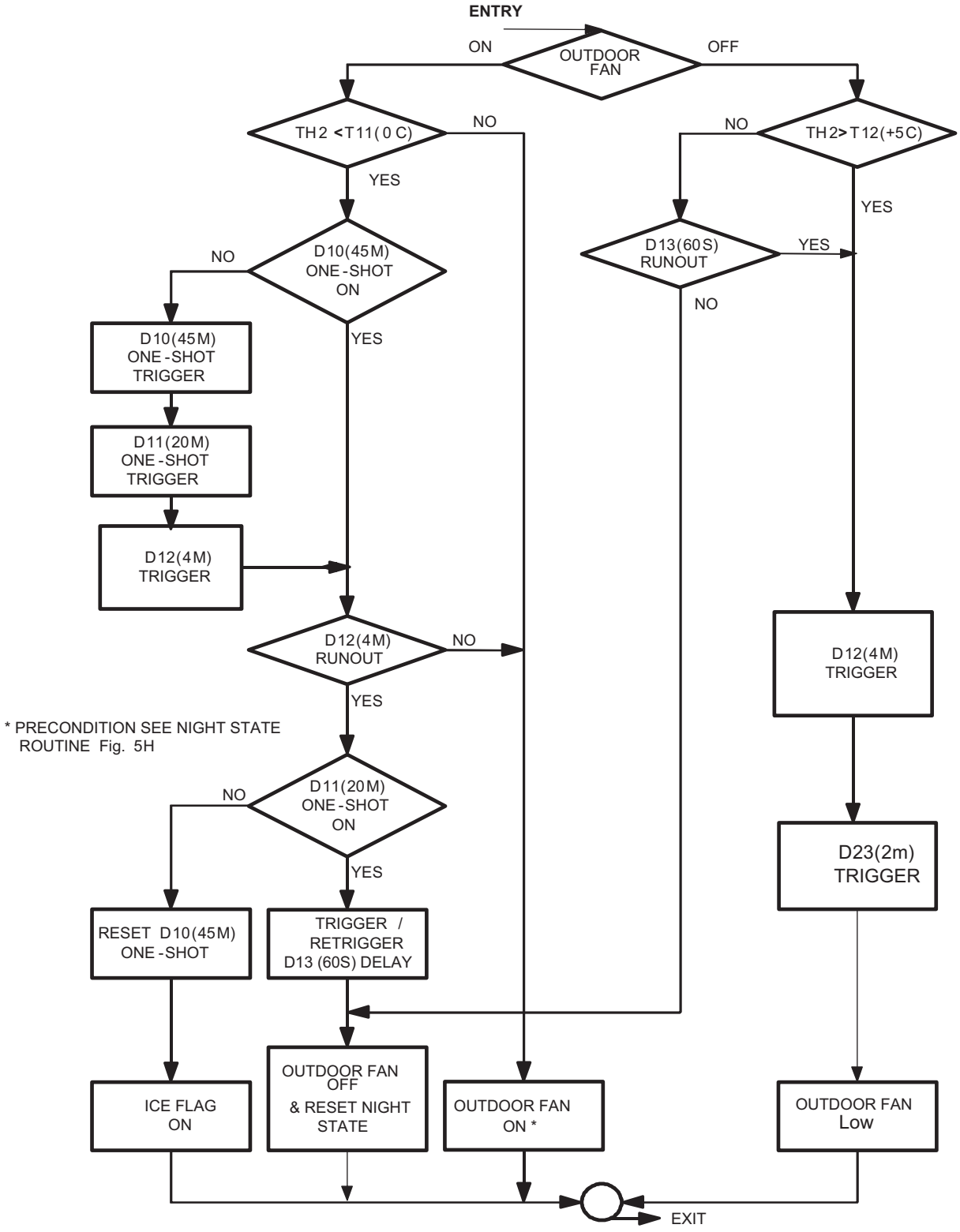
Drawing 24: CHANGE MODE ROUTINE (FIG. 5D)



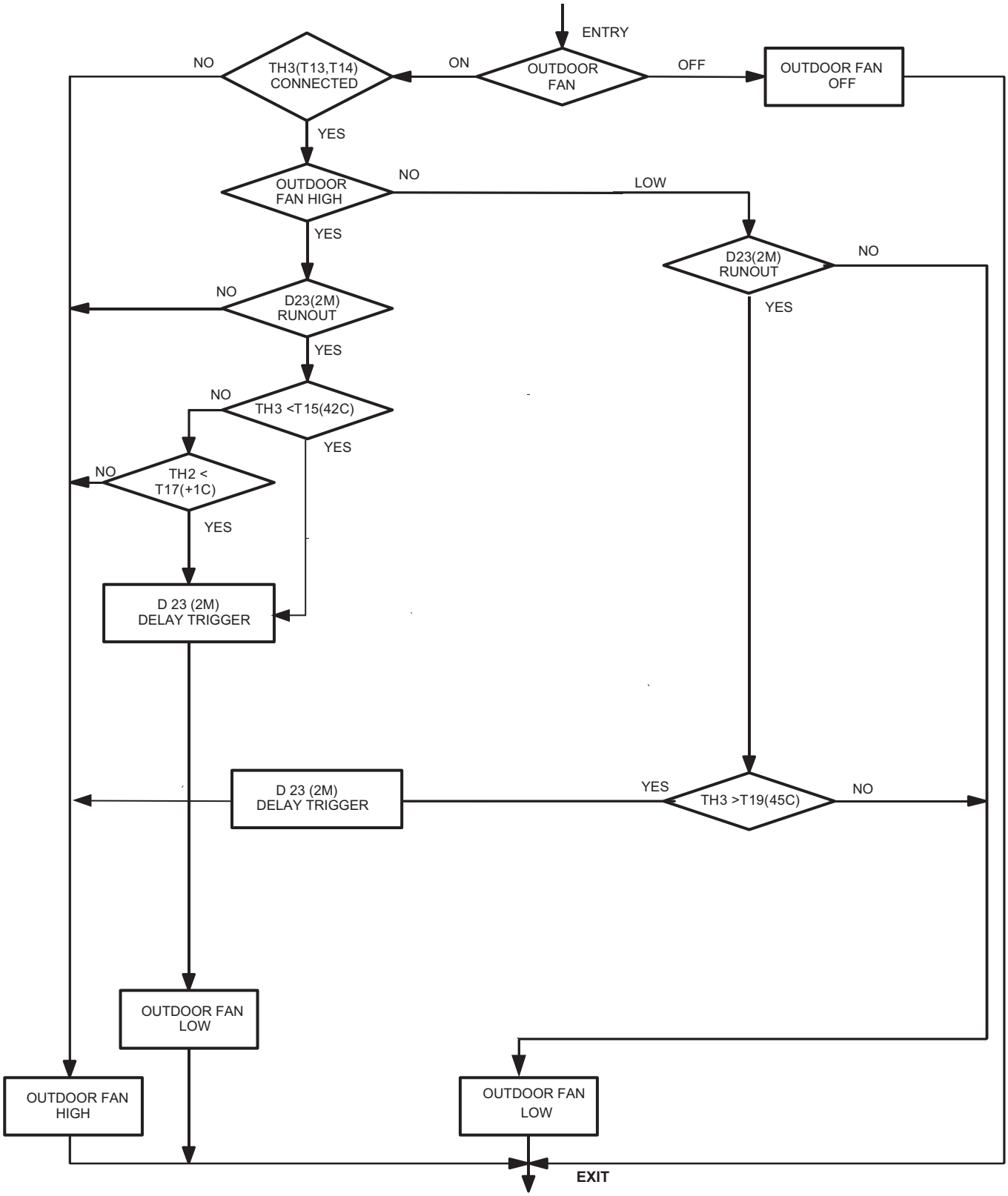
Drawing 25: INDOOR FAN ROUTINE COOL MODE (FIG. 5E)



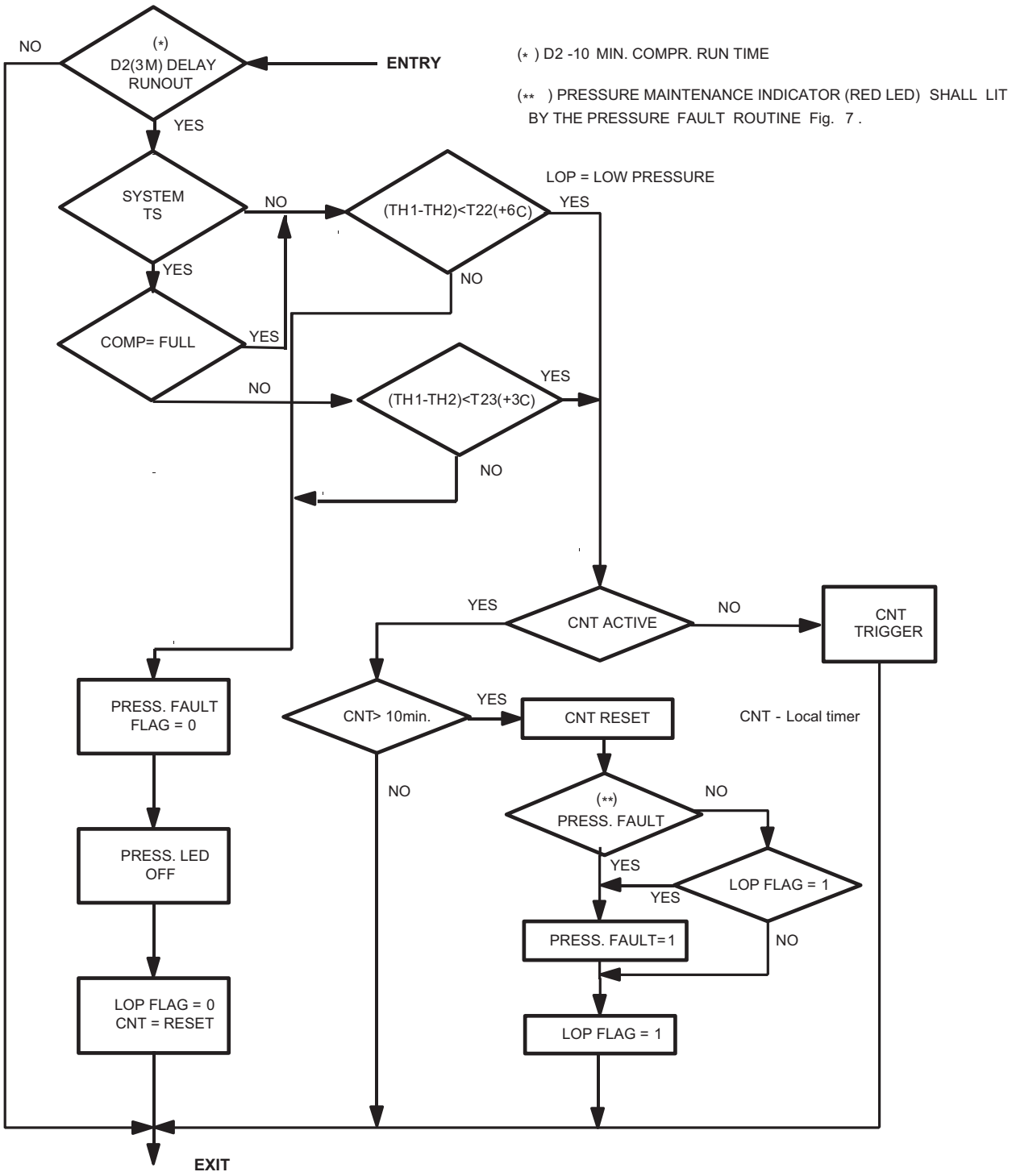
Drawing 26: COMPRESSOR OFF ROUTINE COOL MODE (FIG. 5F)



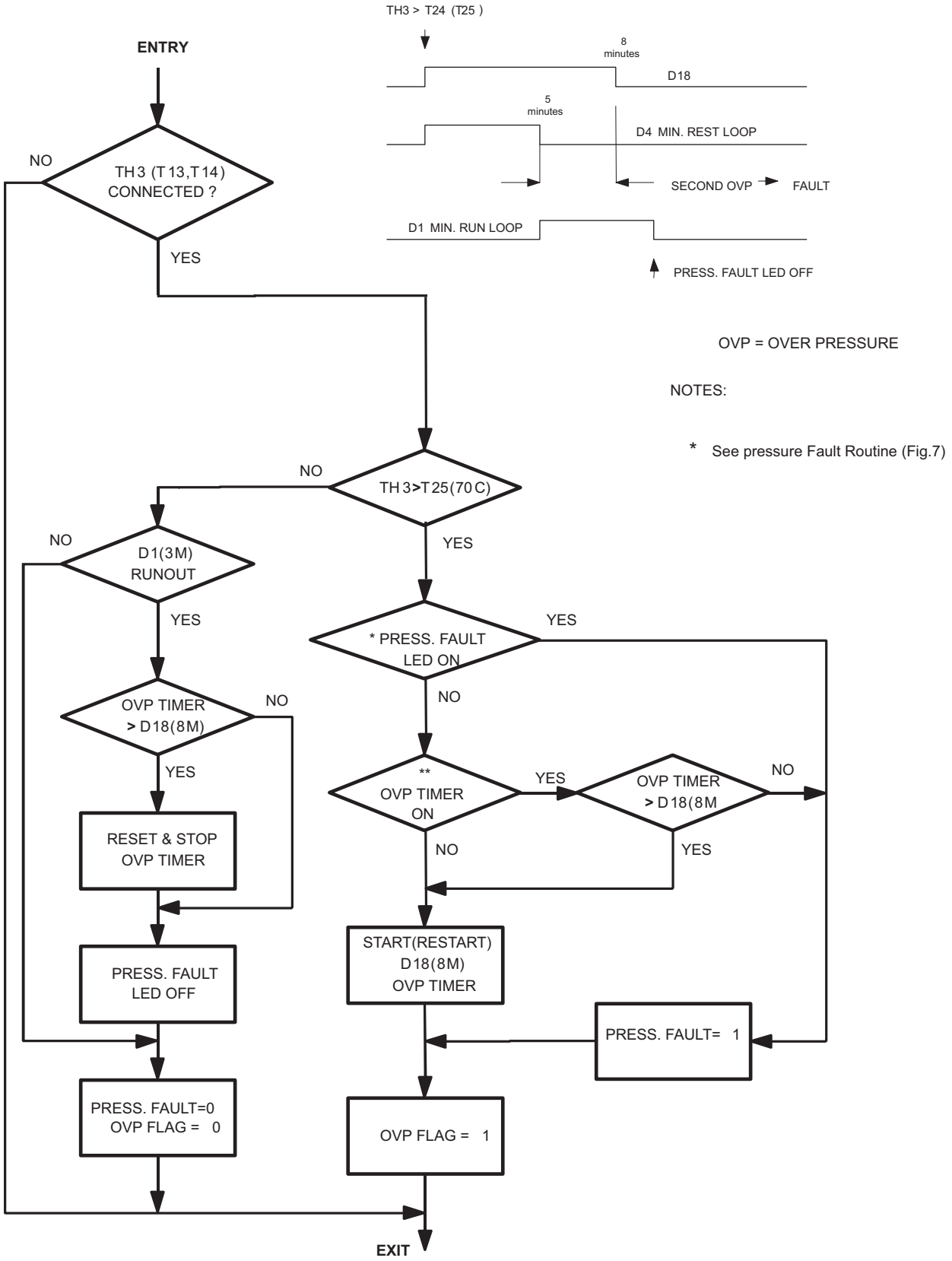
Drawing 27: INDOOR ANTI-ICE ROUTINE COOL & DRY MODES (FIG. 5G)



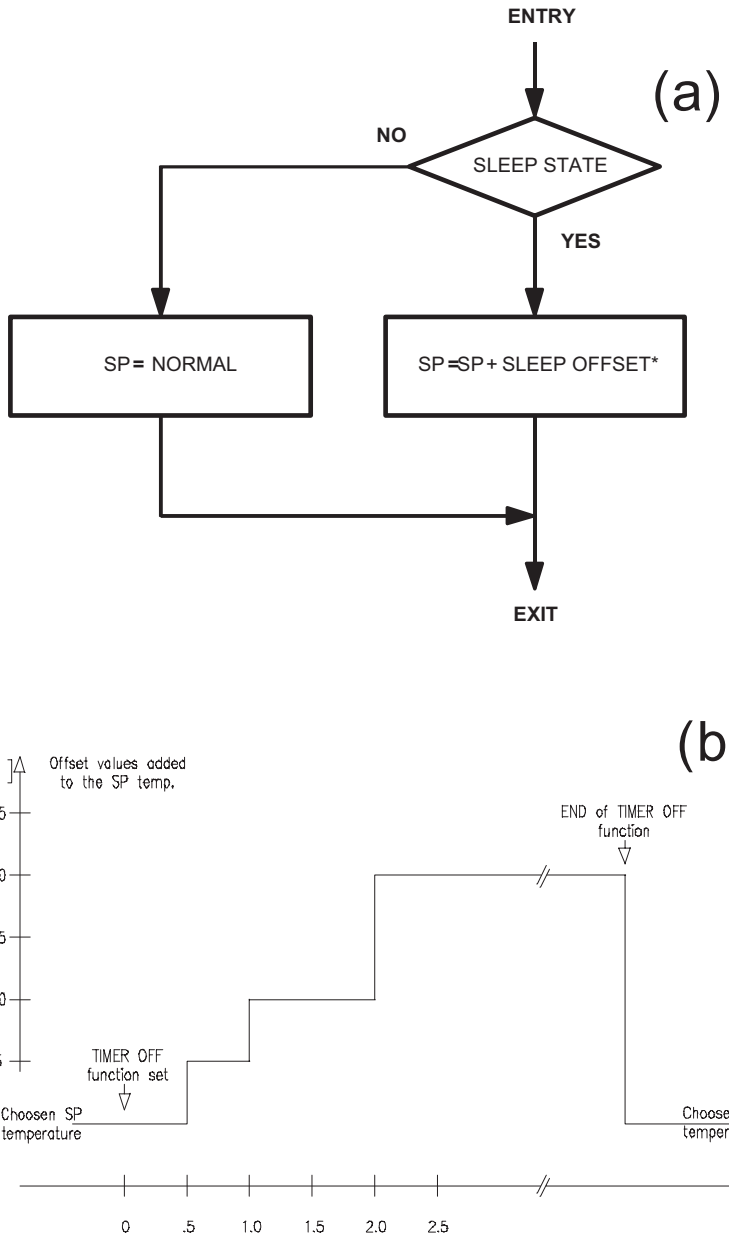
Drawing 28: NIGHT STATE ROUTINE COOL & DRY MODES (FIG. 5H)



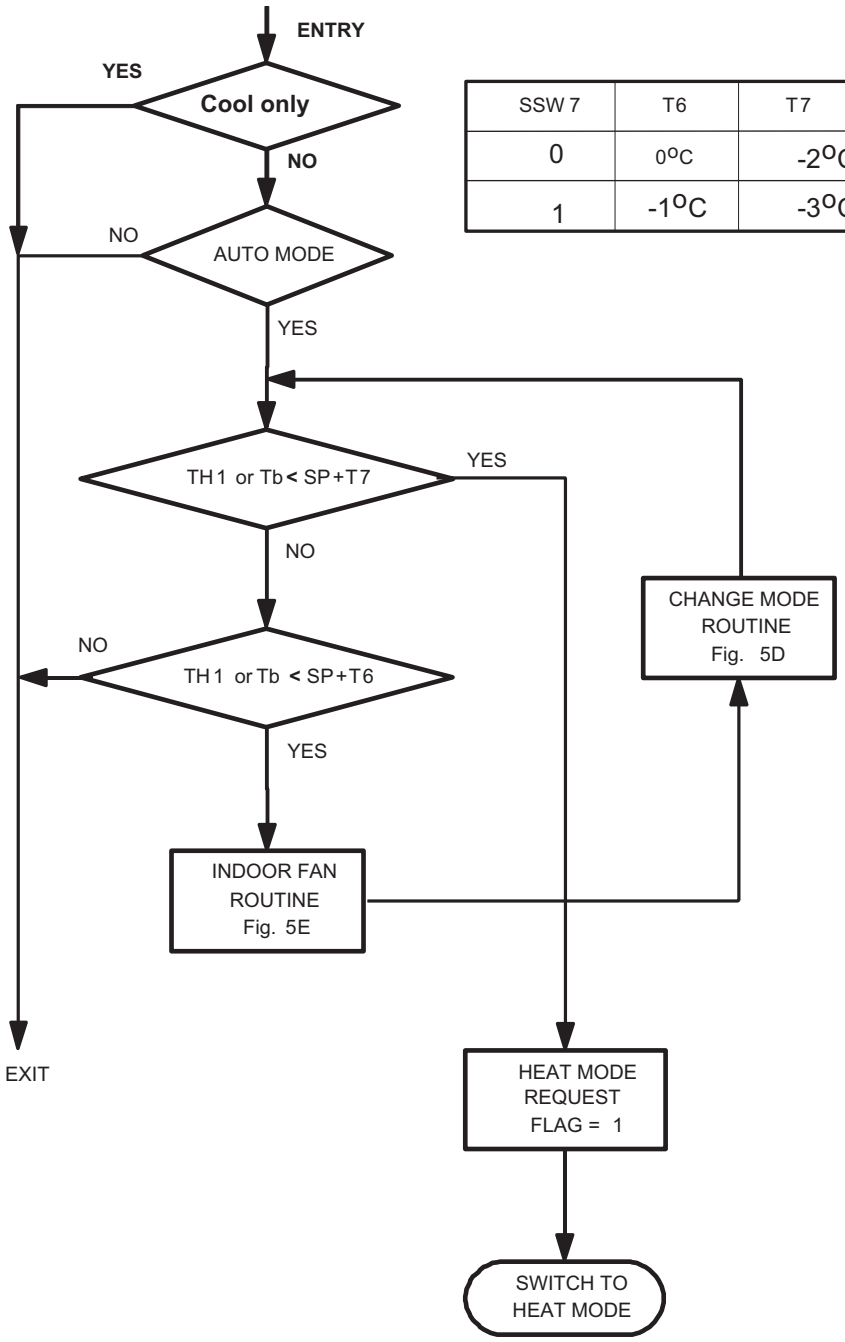
Drawing 29: LOW-PRESSURE (LOP) ROUTINE COOL & DRY MODES (FIG. 5I)



Drawing 30: OVER-PRESSURE ROUTINE COOL & DRY MODES (FIG. 5J)

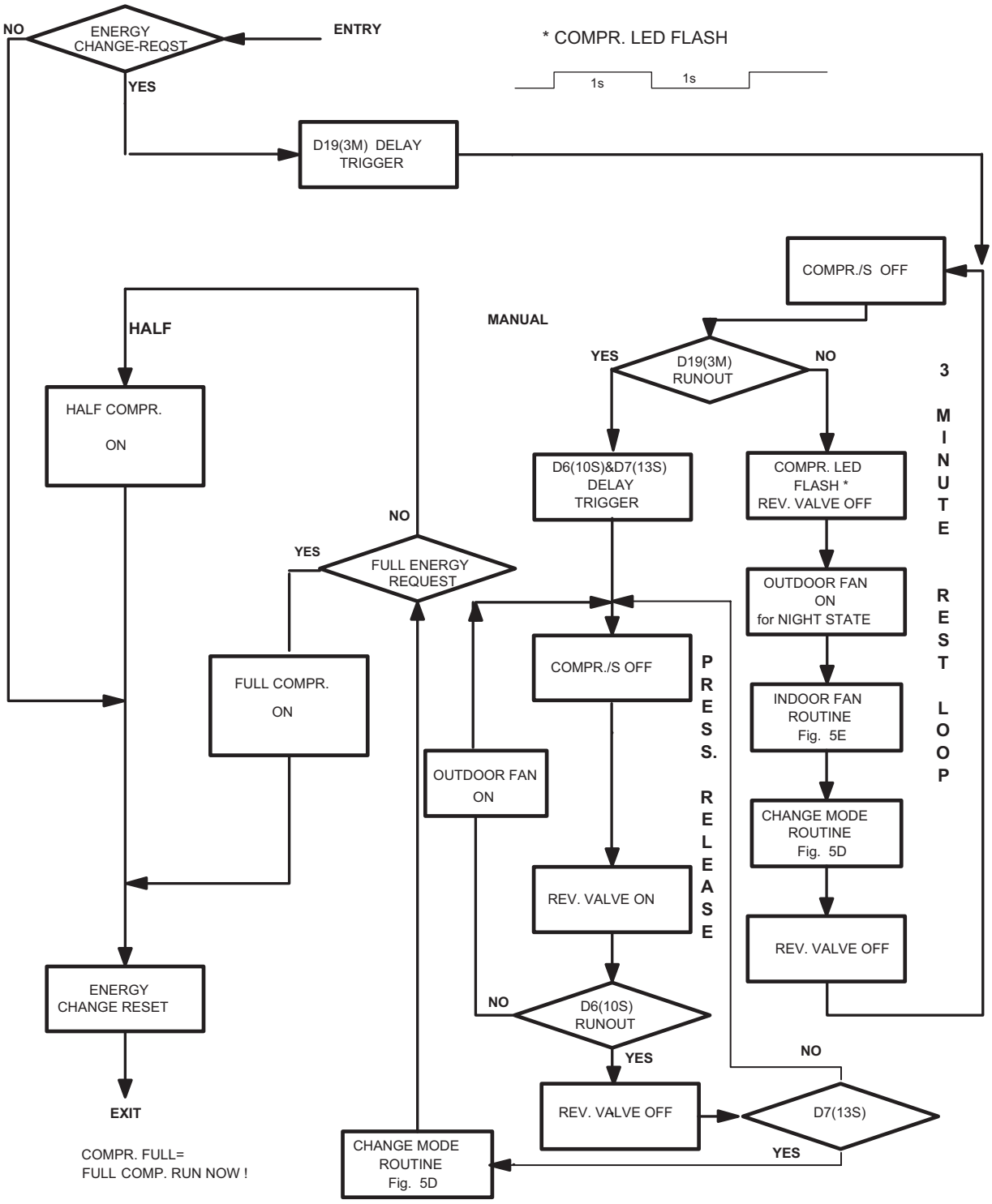


Drawing 31: SLEEP COOL MODE & DRY MODE (FIG. 5K)

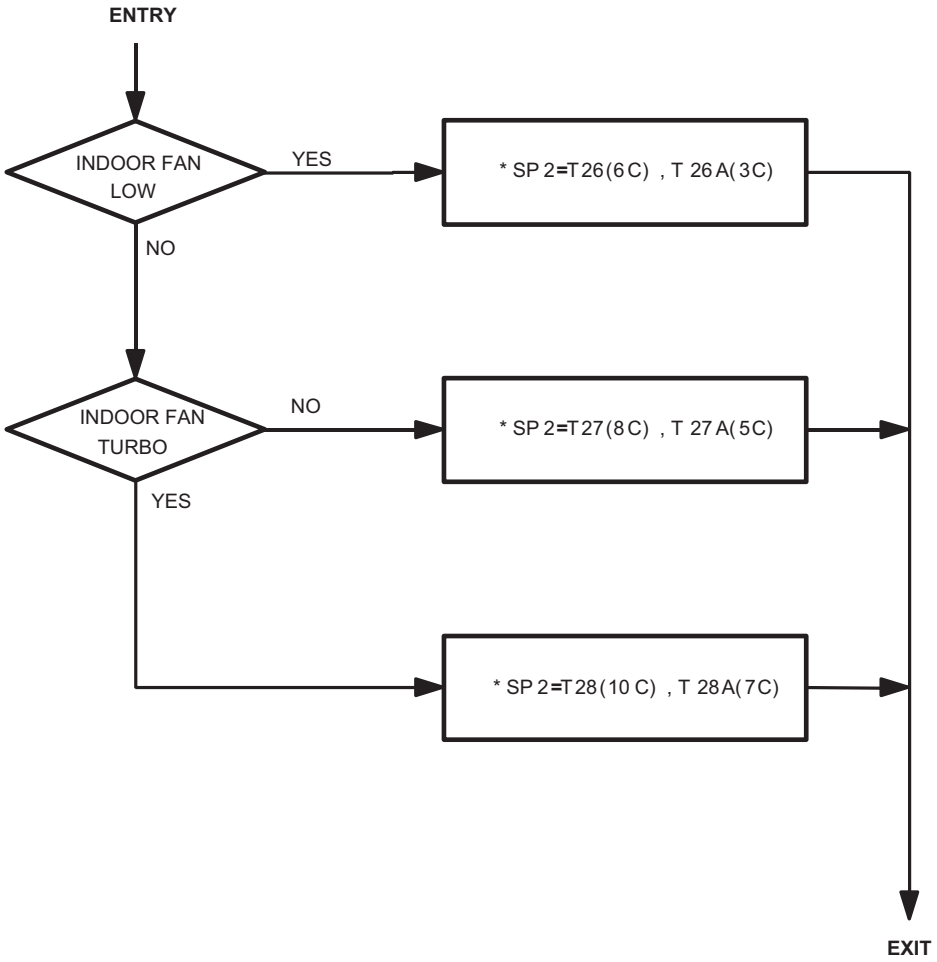


SSW 7	T6	T7	Install.
0	0°C	-2°C	UPPER/BEACON/ANL
1	-1°C	-3°C	LOWER

Drawing 32: CONDITIONING ROUTINE COOL MODE (FIG. 5L)

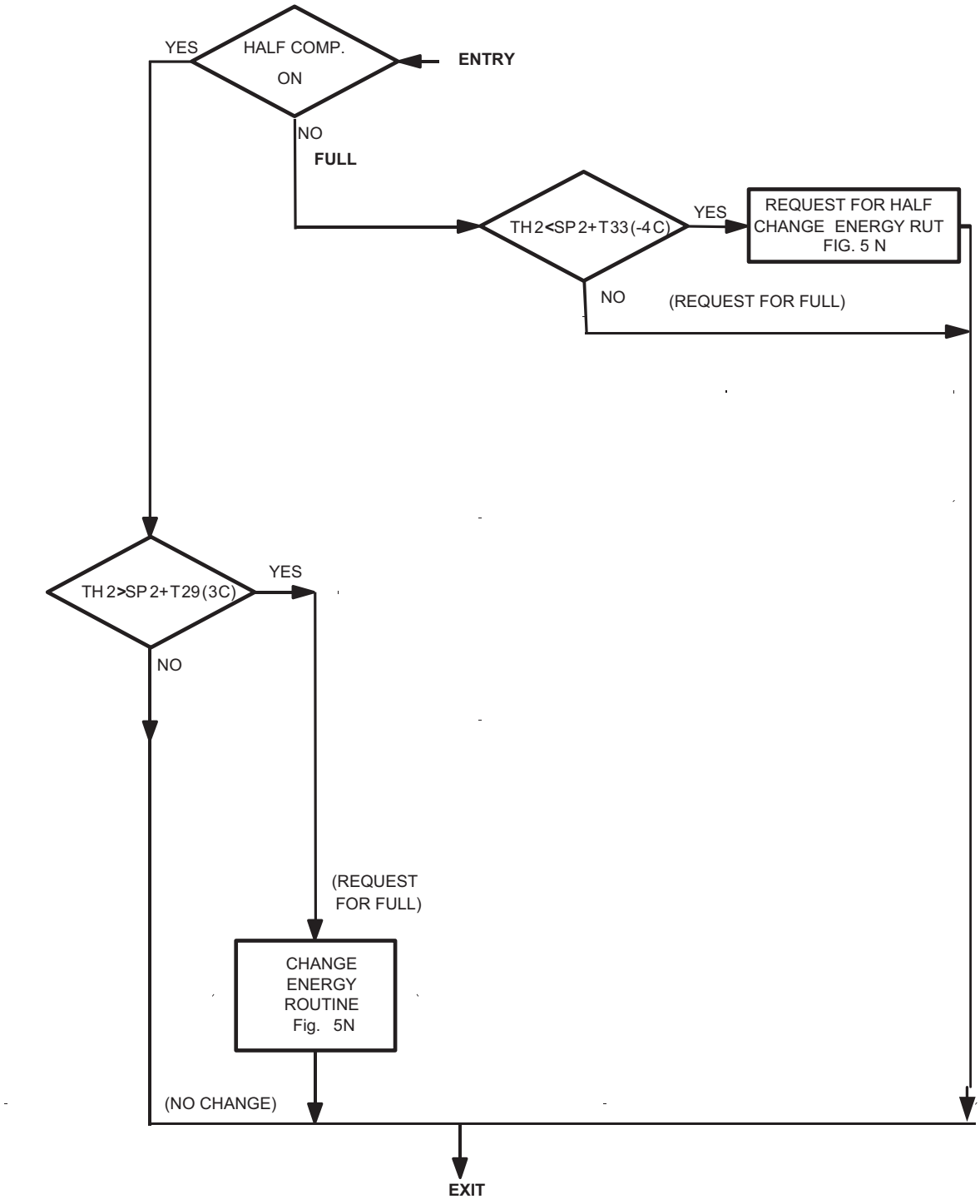


Drawing 33: ENERGY CHANGE ROUTINE COOL MODE (FIG. 5N)

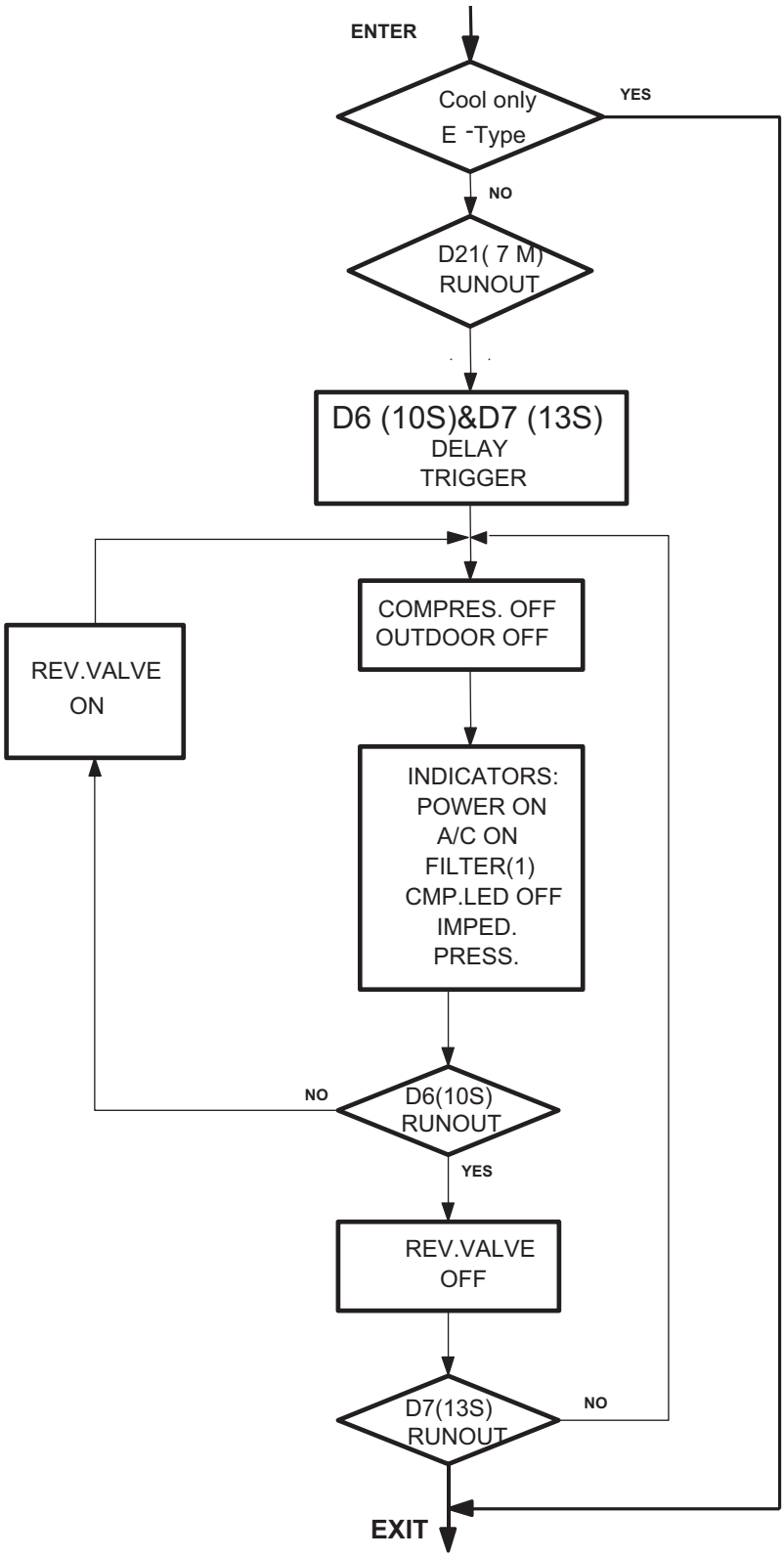


* The SP 2 value is SSW 8 dependent

Drawing 34: SP2 VALUES ROUTINE COOL & DRY MODES (FIG. 5O)

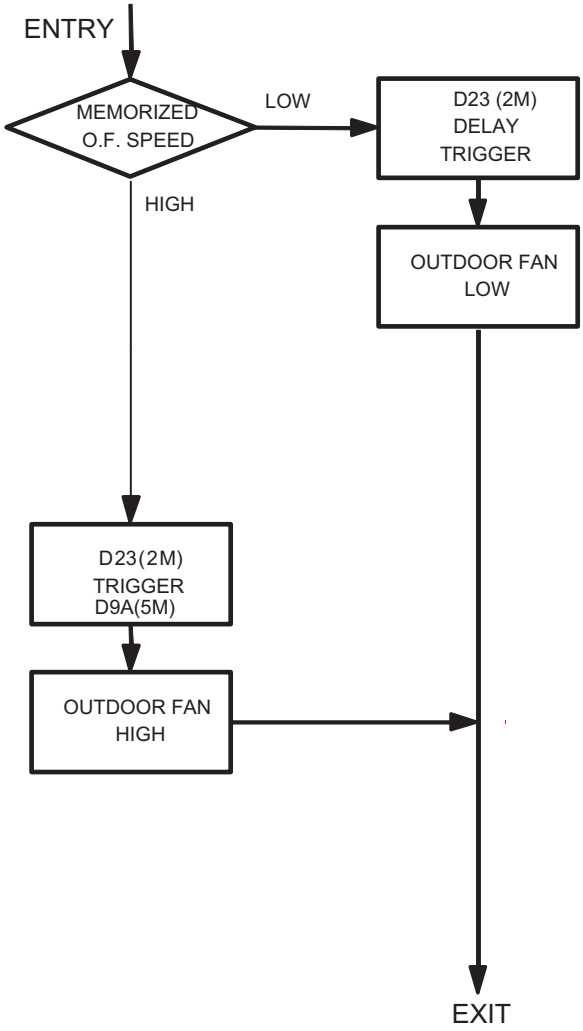


Drawing 35: AUTO ENERGY COOL MODE & DRY MODE (FIG. 5P)

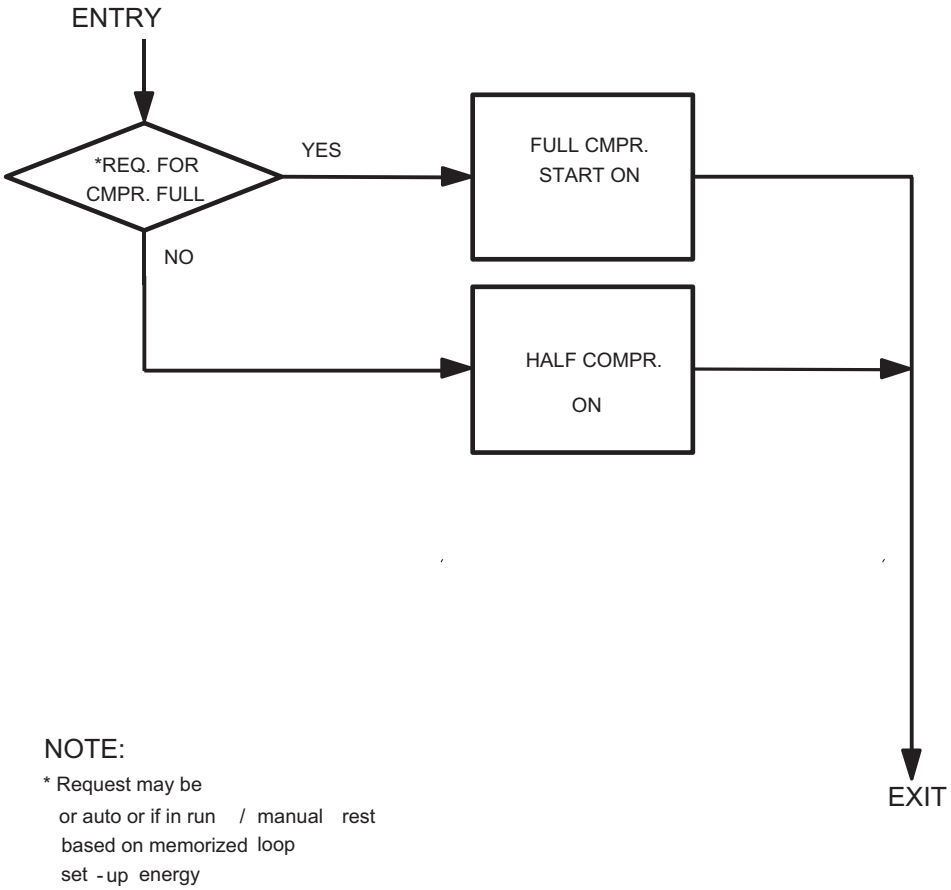


Notes :
(1) See Fitler Check Fig. 10

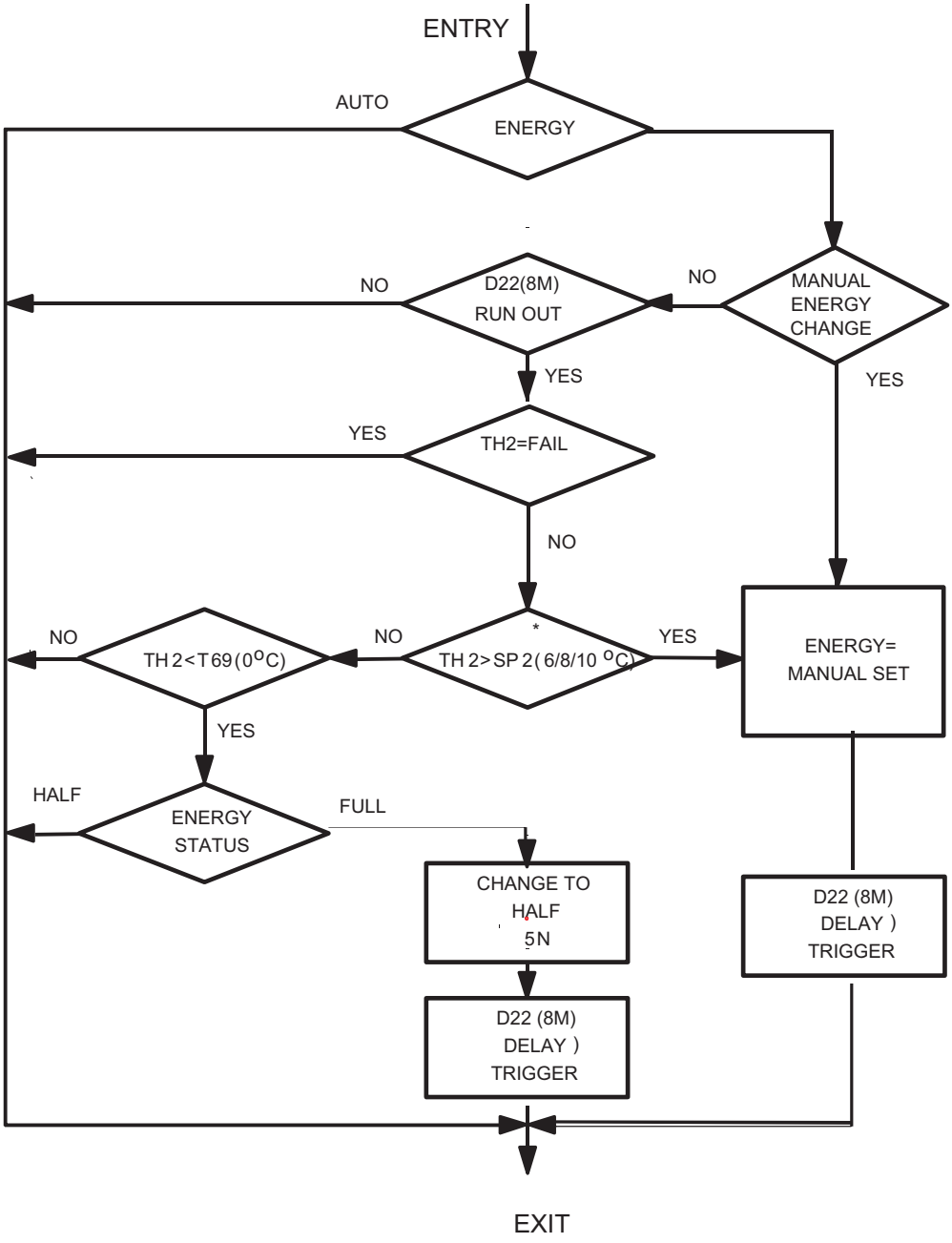
Drawing 36: QUICK PRESSURE RELEASE ROUTINE - COOL MODE (FIG. 5Q)



Drawing 37: RECOVER OUTDOOR FAN SPEED ROUTINE-COOL & DRY MODES (FIG. 5R)

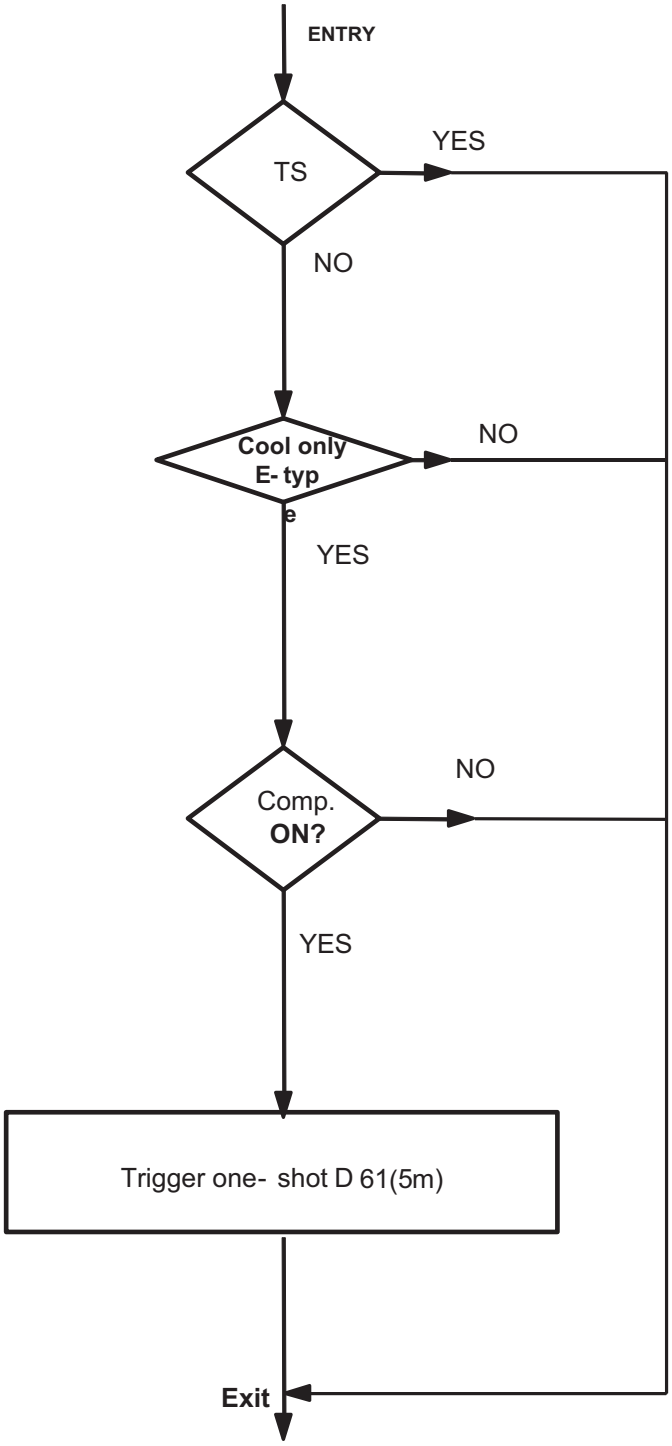


Drawing 38: RECOVER ENERGY SET-UP COOL & DRY MODES (FIG. 5S)

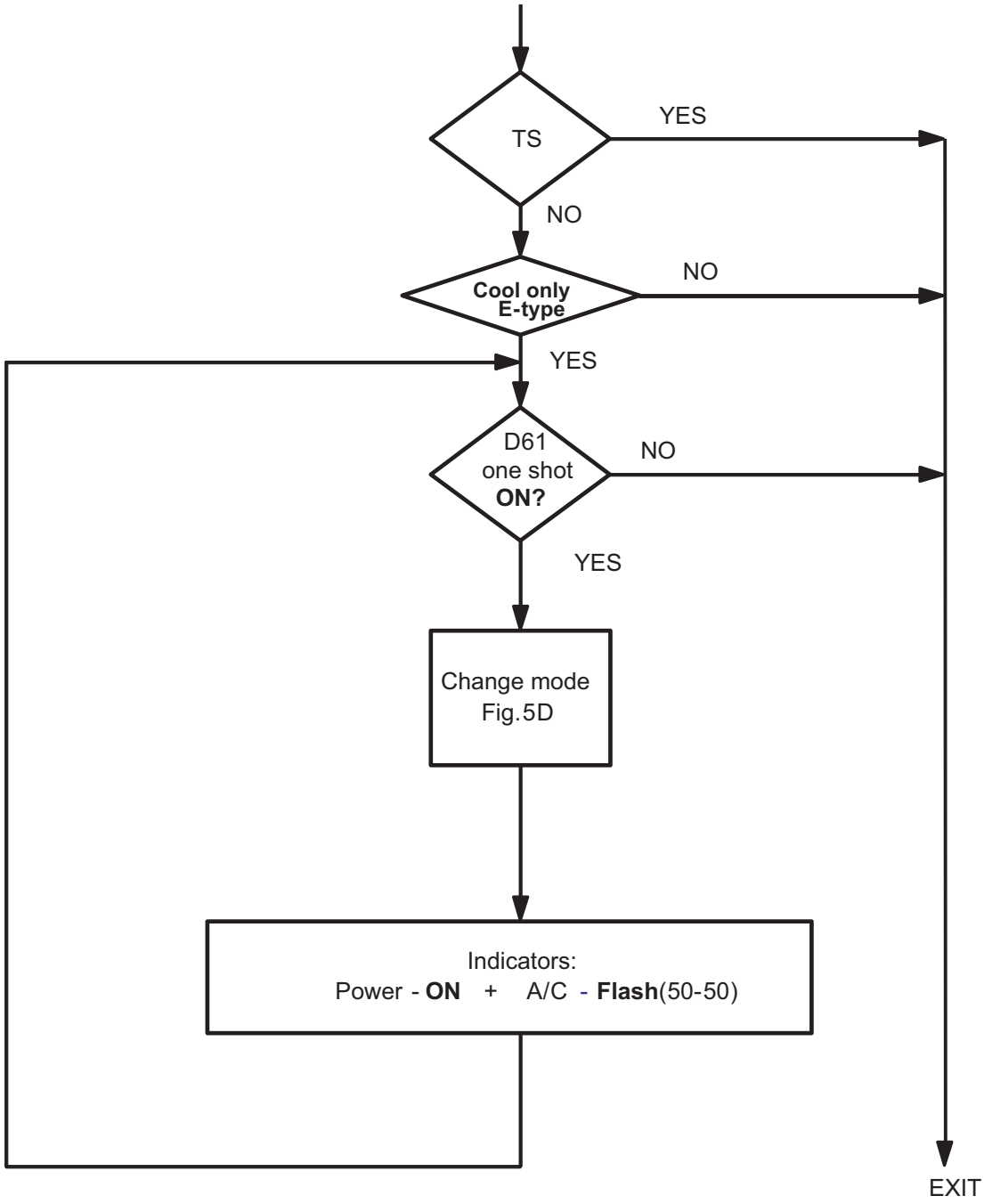


* SP 2 is defined in fig. 5O routine

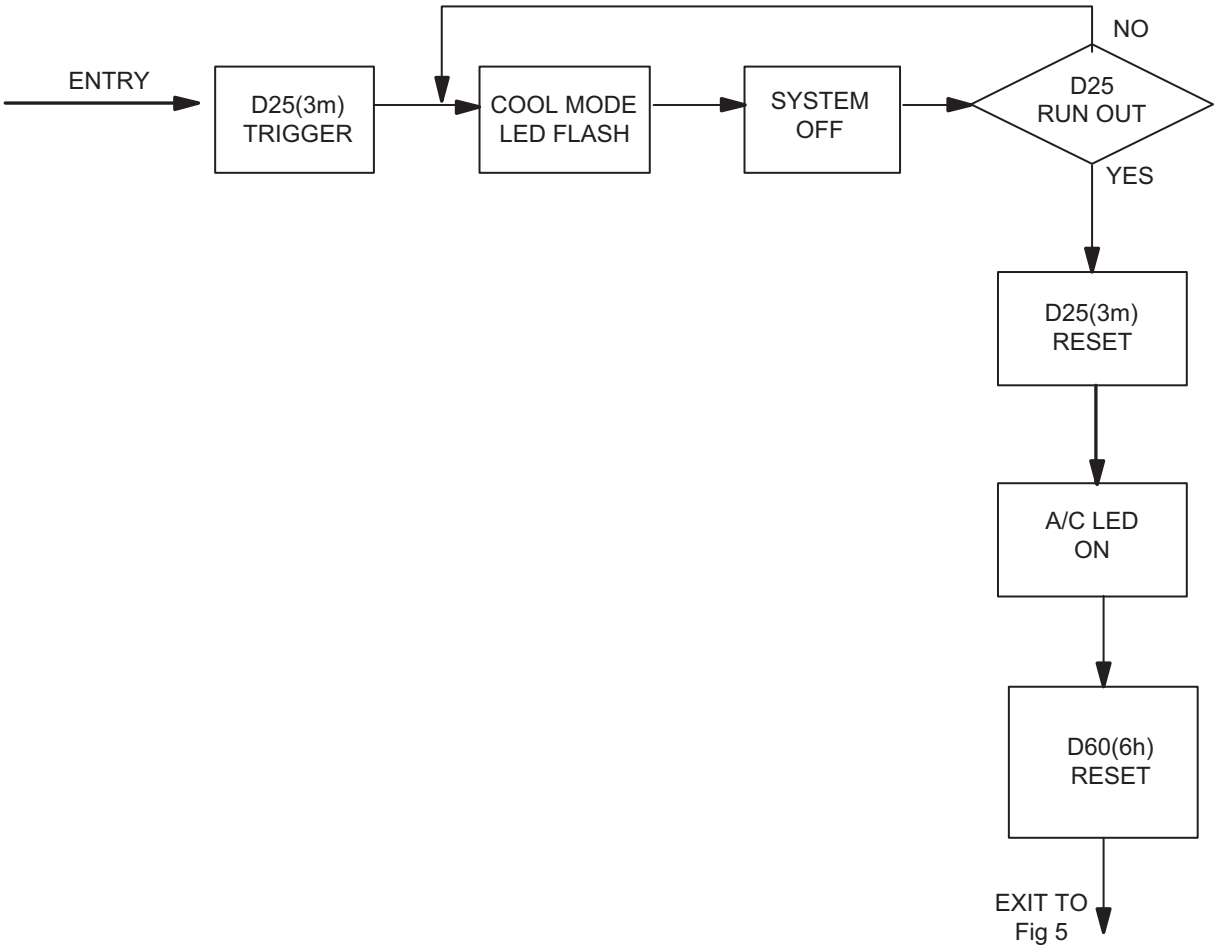
Drawing 39: PRE-ICE ENERGY CHANGE COOL MODE & DRY MODE (FIG. 5T)



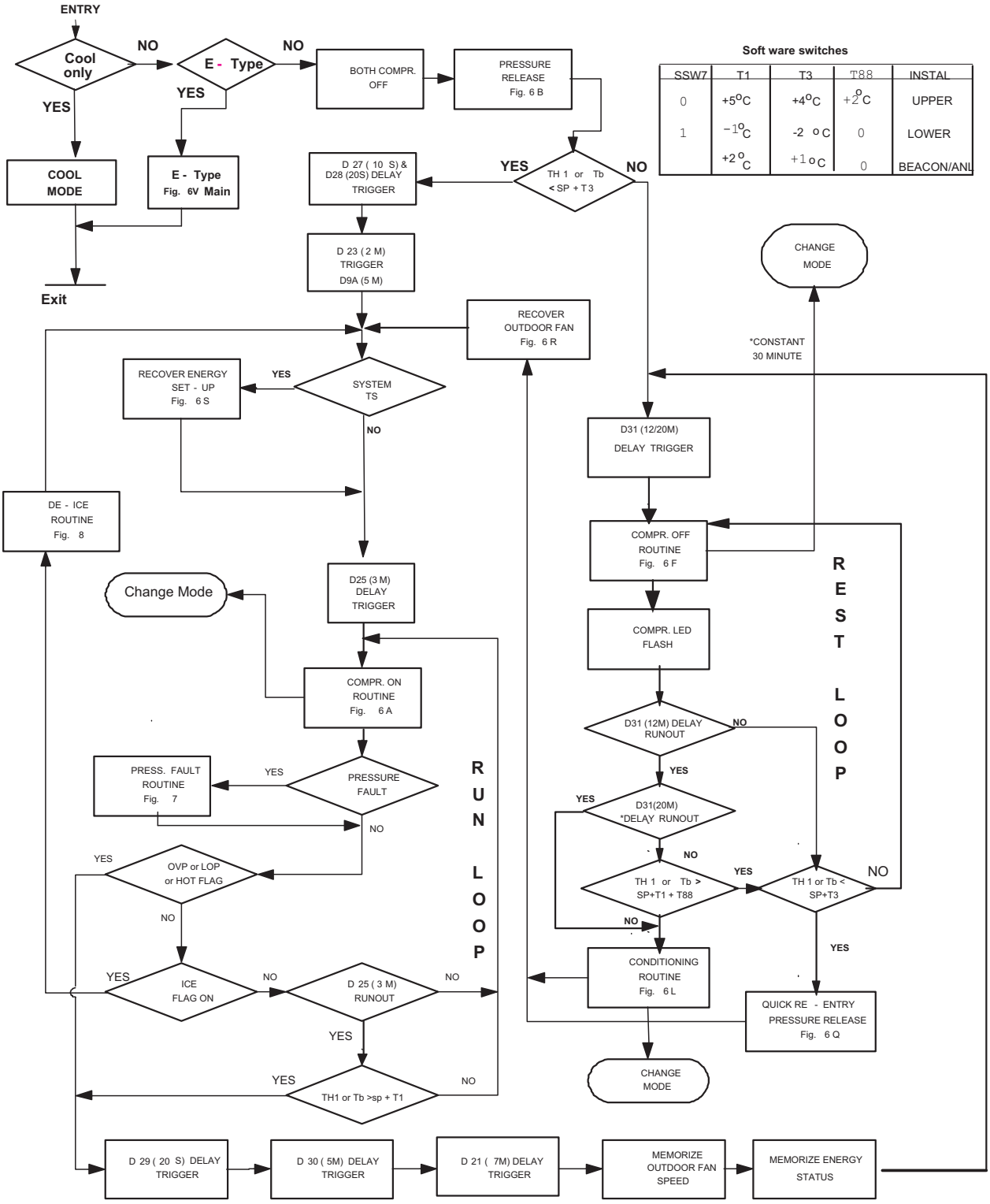
Drawing 40: COMP. OFF DELAY CREATION/COOL-ONLY or E-TYPE COOL MODE (FIG. 5U)



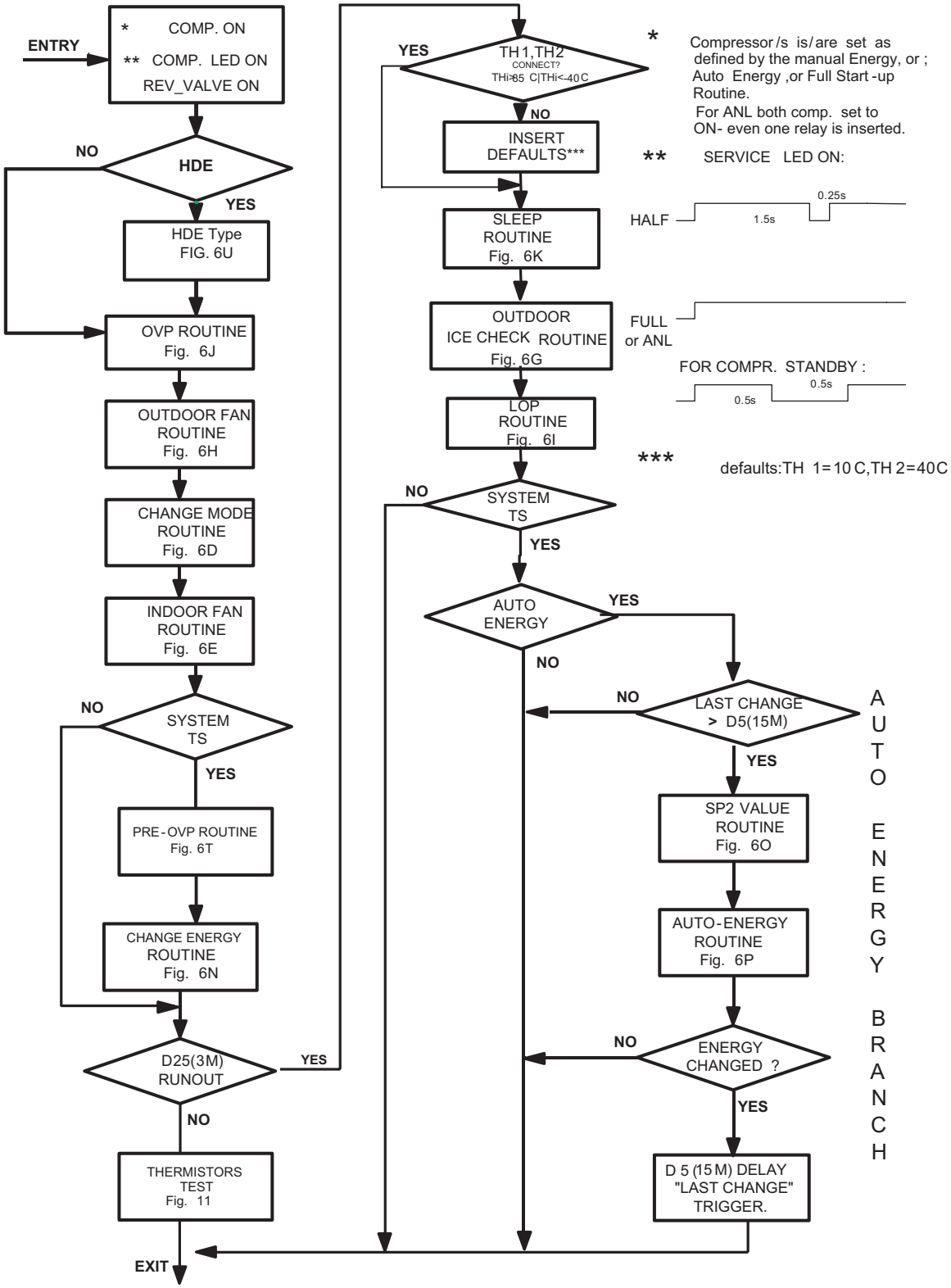
Drawing 41: PREPARE TO COMP. ON/COOL ONLY or E-TYPE COOL MODE (FIG. 5V)



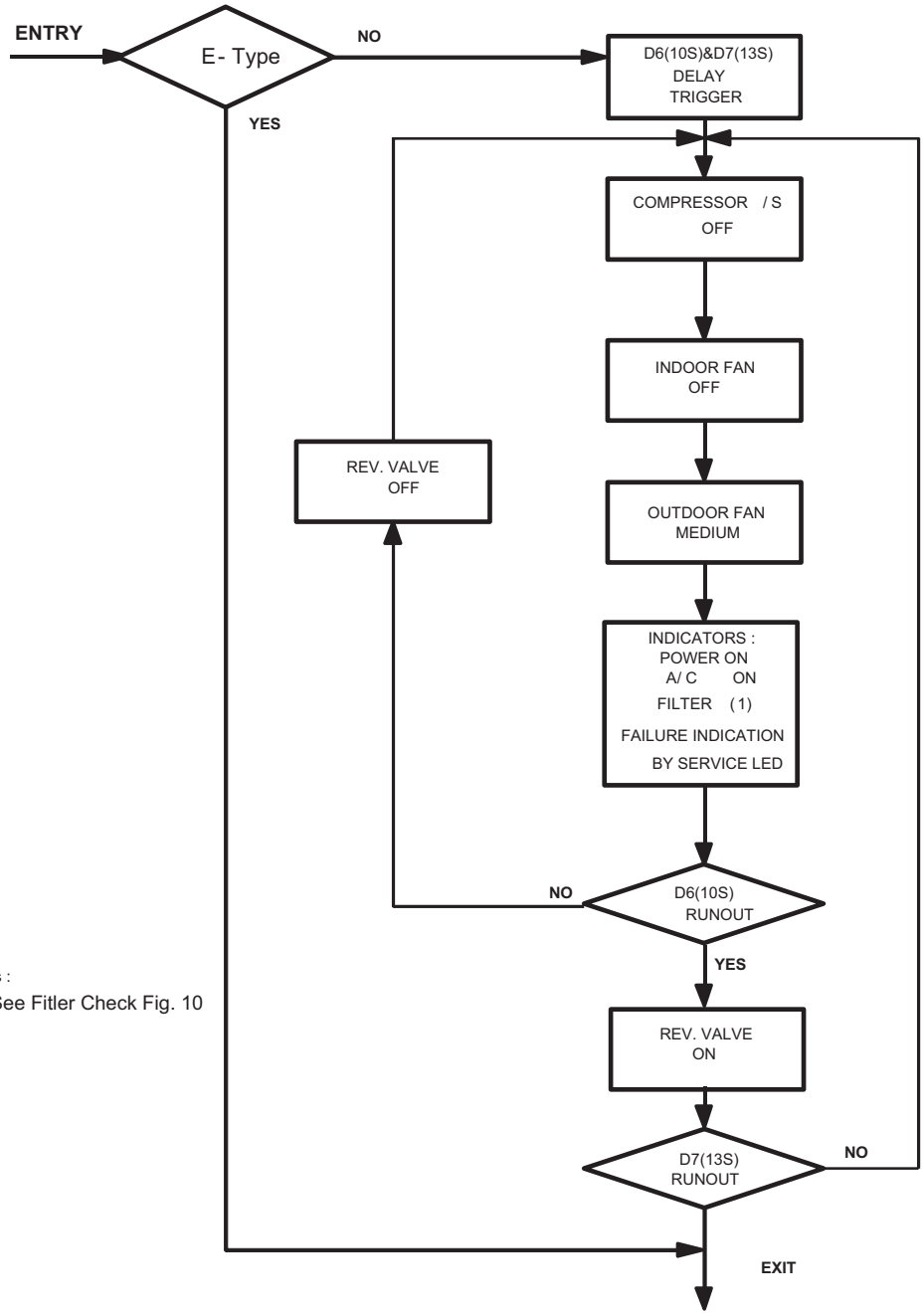
Drawing 42: AN DRAIN ROUTINE (FIG. 5W)



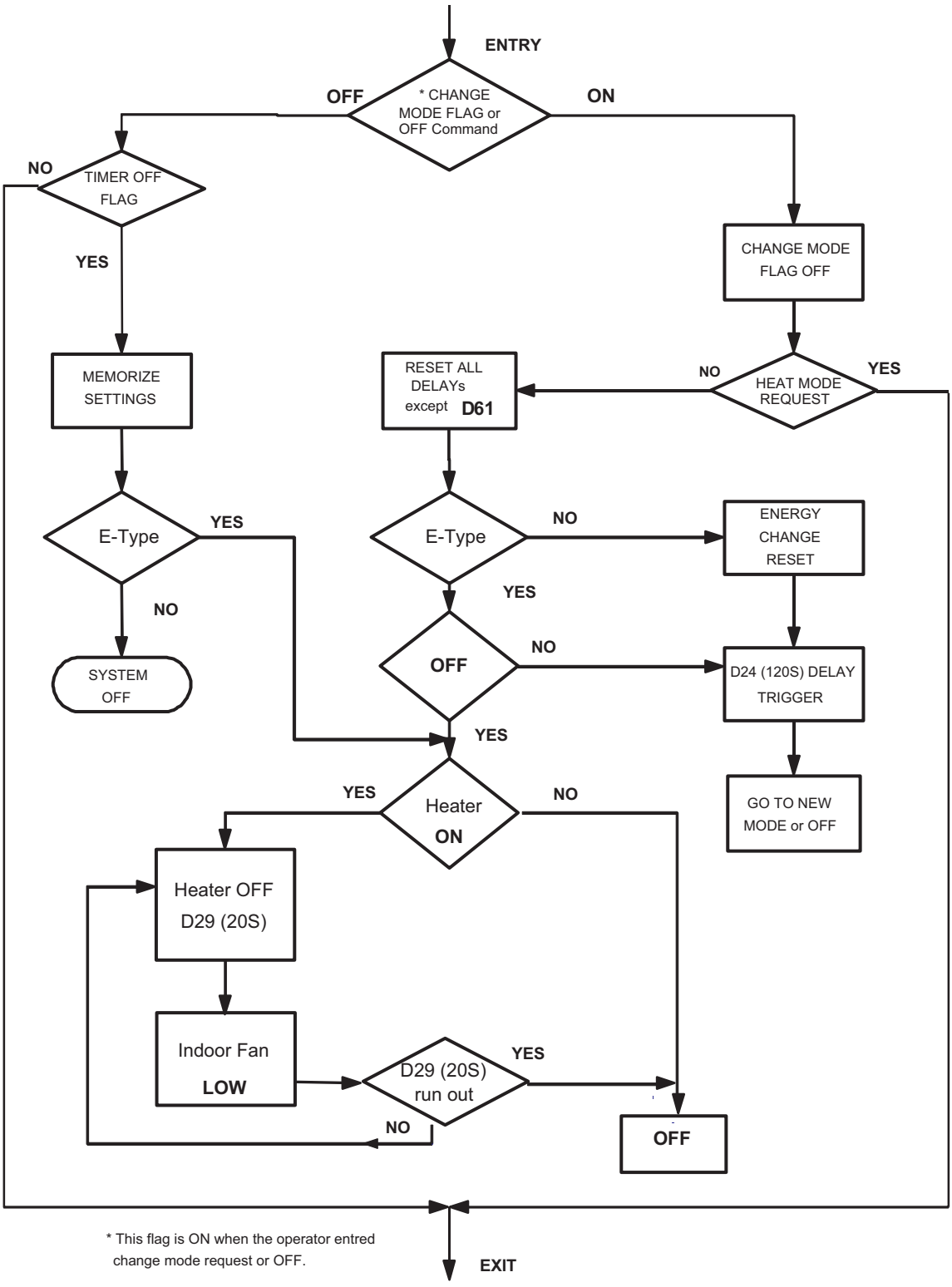
Drawing 43: HEAT MODE - MAIN (FIG. 6)



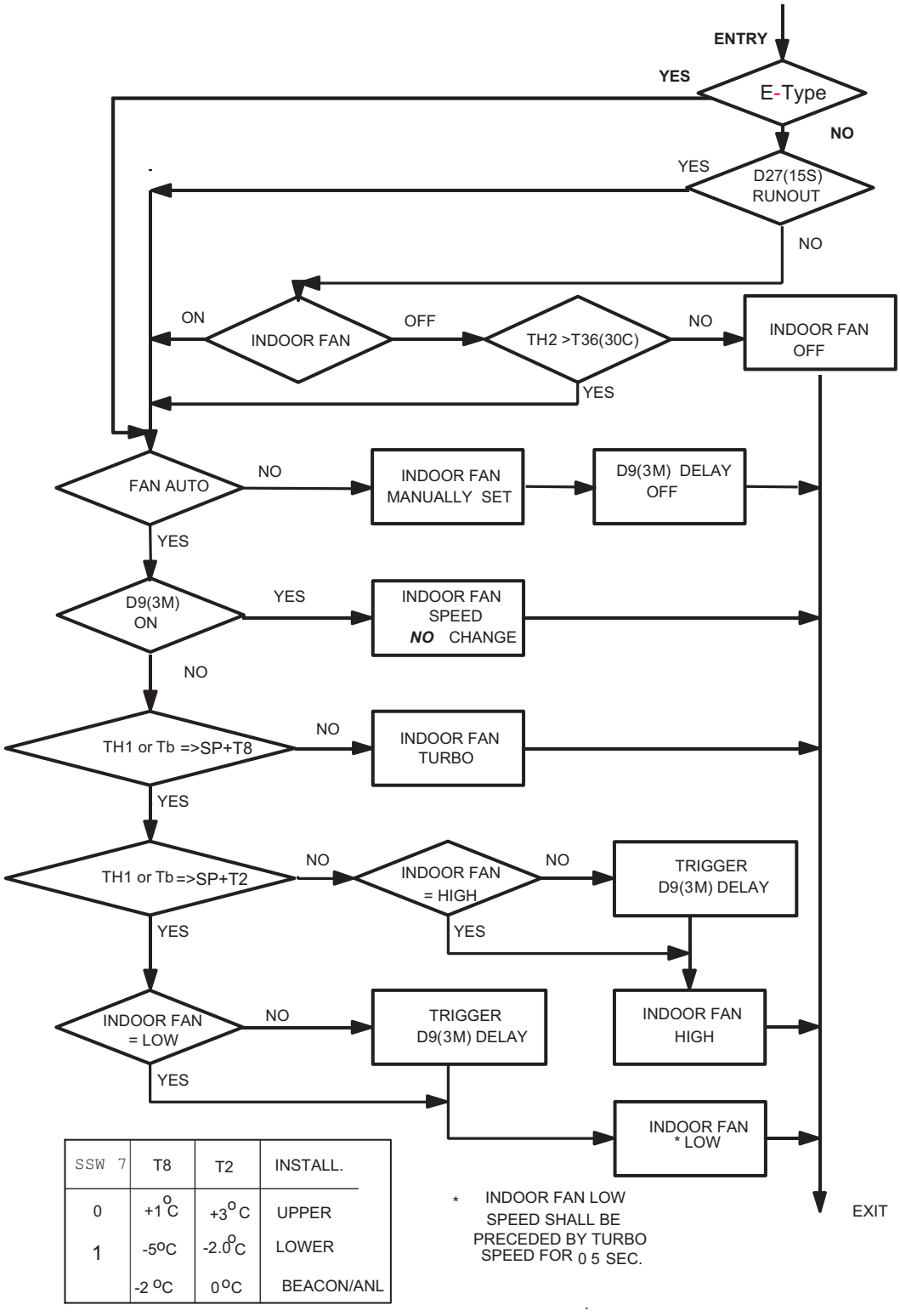
Drawing 44: COMPRESSOR ON ROUTINE HEAT MODE (FIG. 6A)



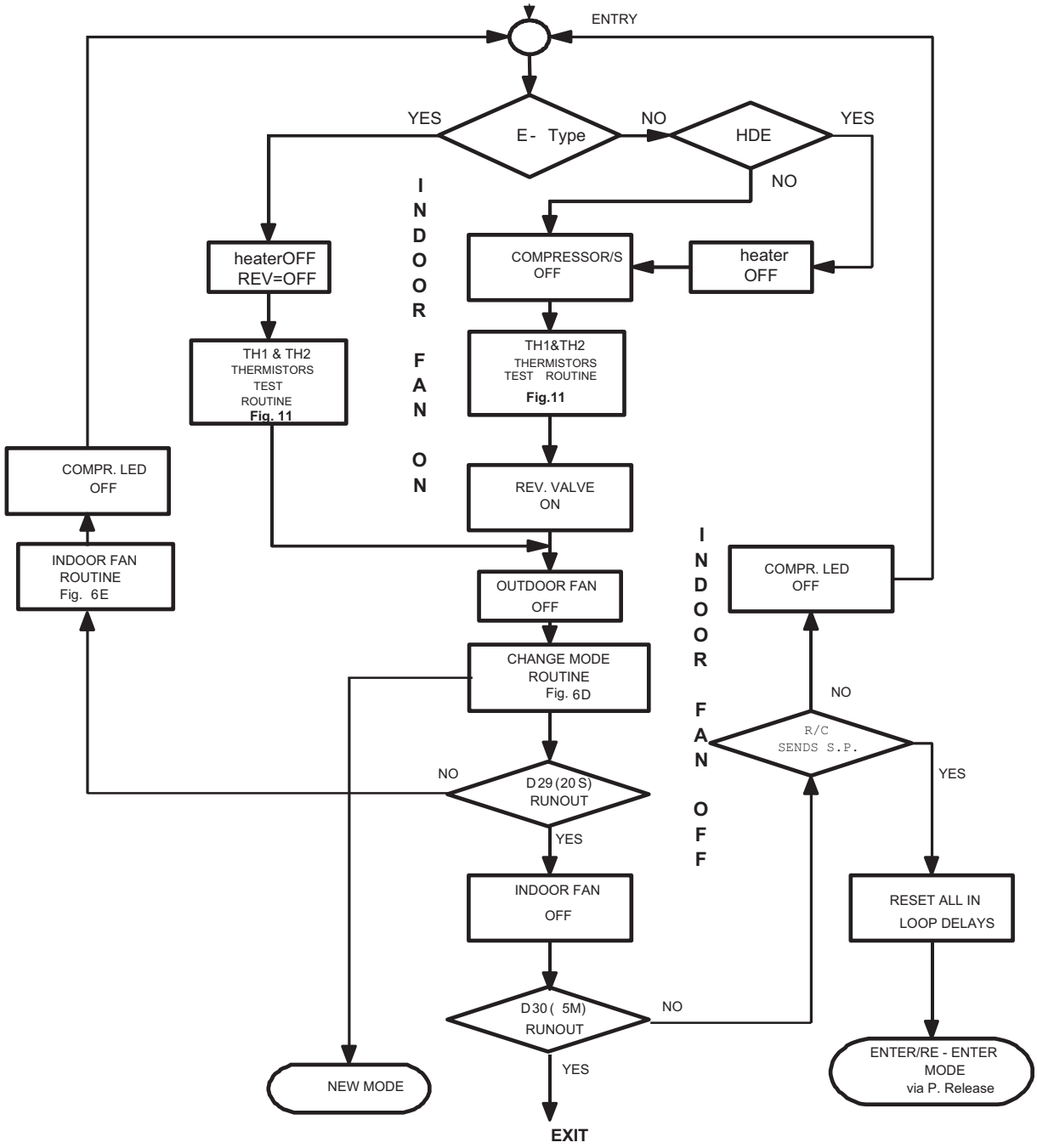
Drawing 45: PRESSURE RELEASE HEAT MODE (FIG. 6B)



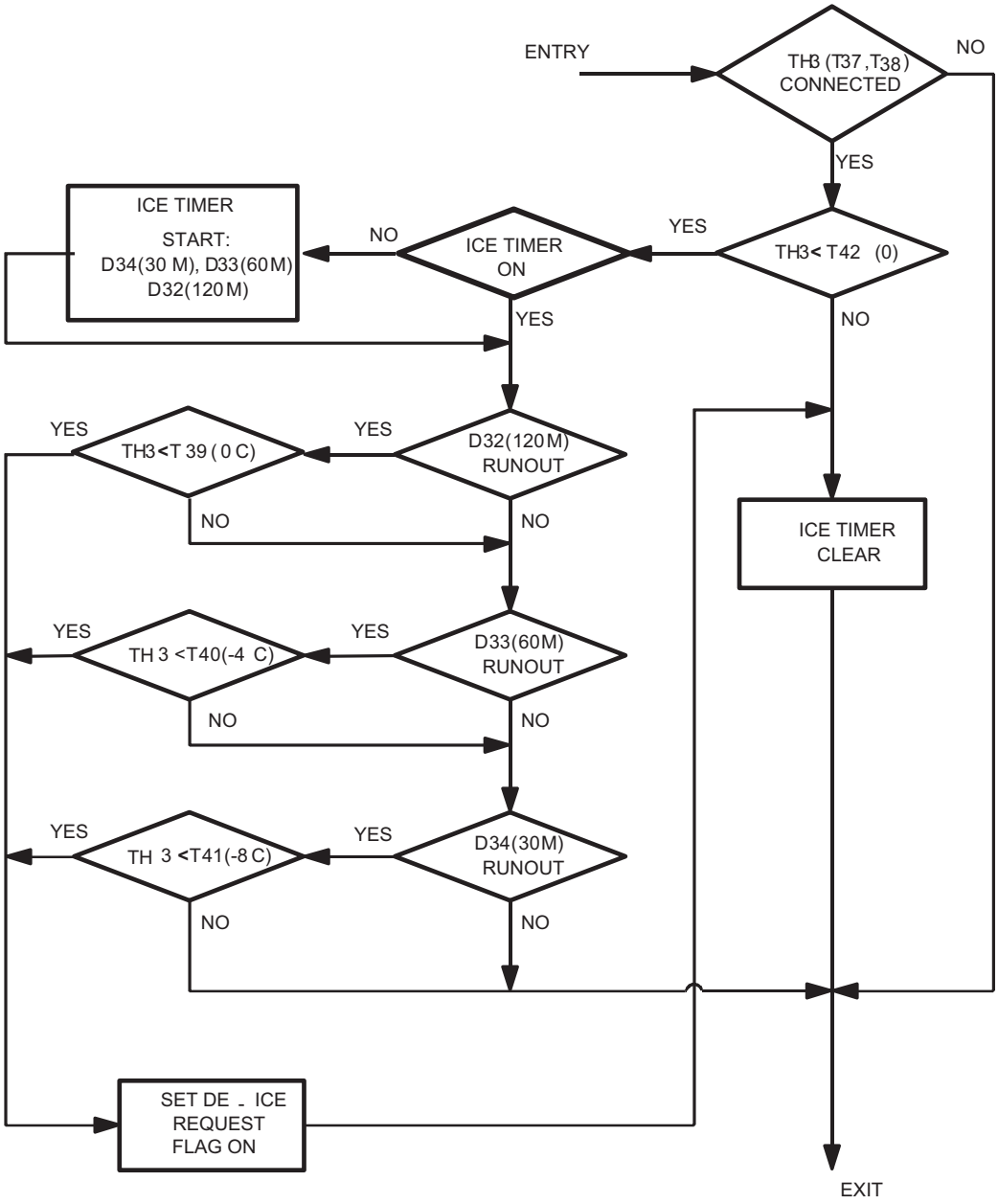
Drawing 46: CHANGE MODE ROUTINE HEAT MODE (FIG. 6D)



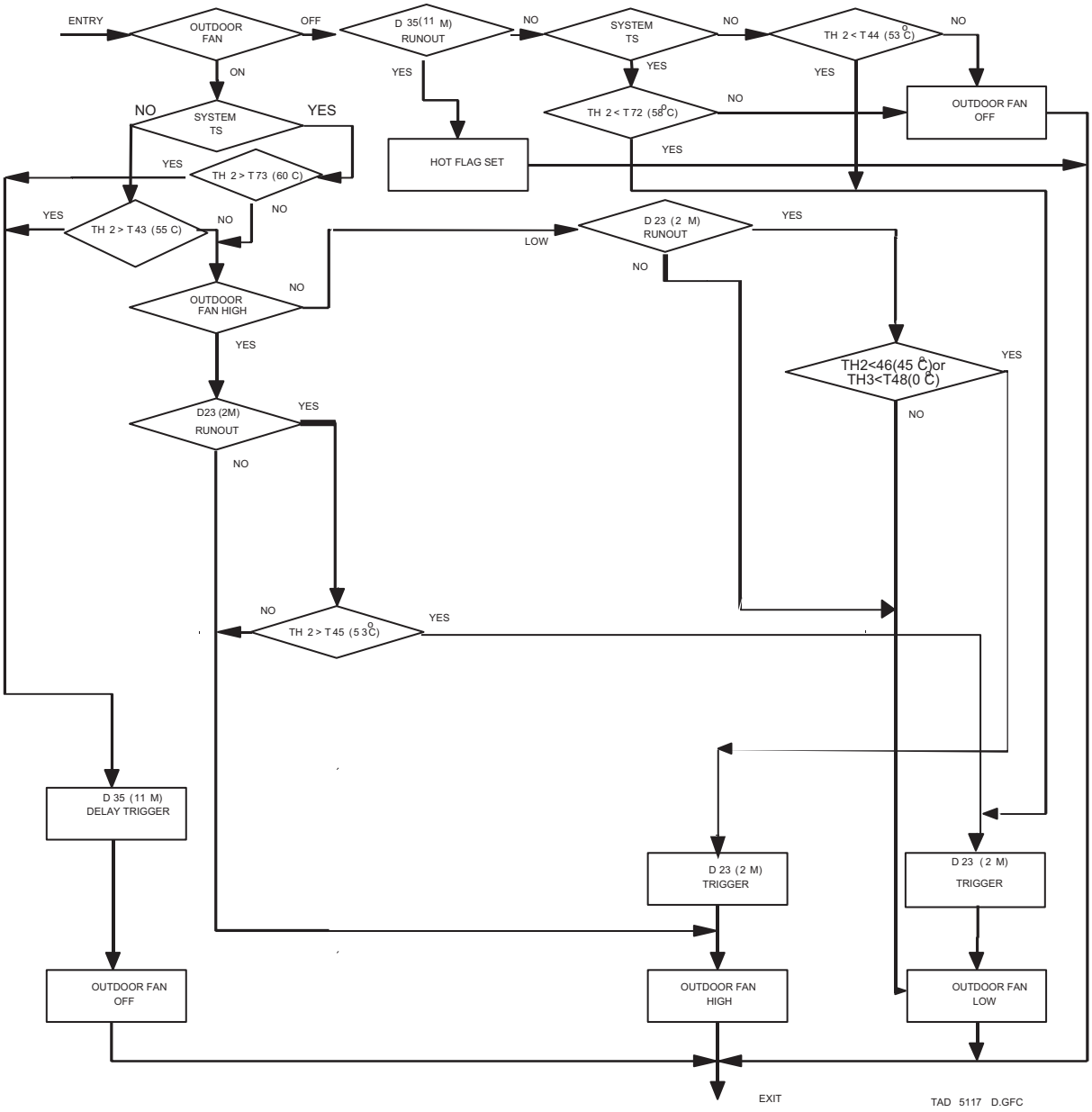
Drawing 47: INDOOR FAN HEAT MODE (FIG. 6E)



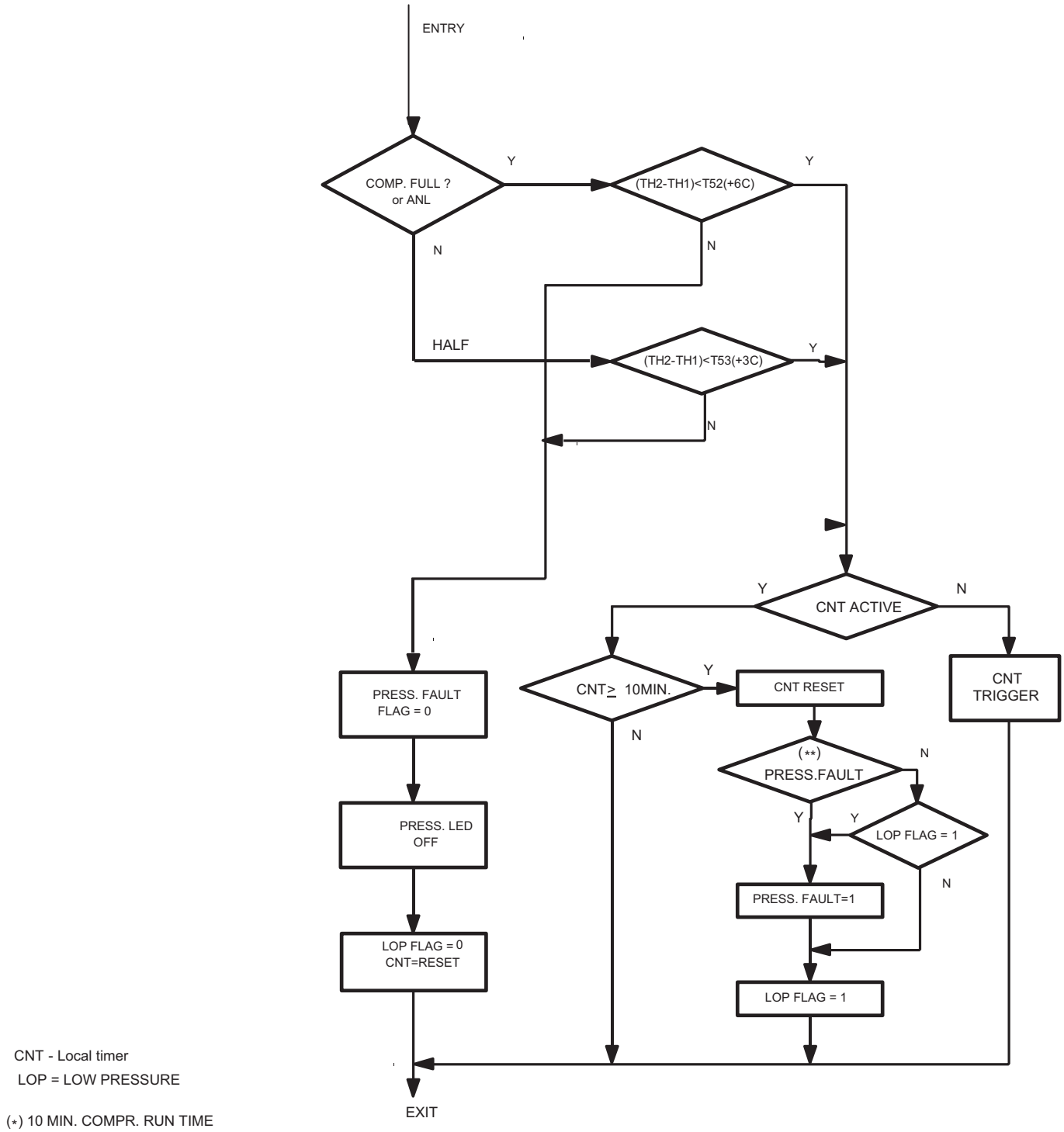
Drawing 48: COMPRESSOR OFF ROUTINE HEAT MODE (FIG. 6F)



Drawing 49: OUTDOOR ICE - CHECK ROUTINE HEAT MODE (FIG. 6G)



Drawing 50: OUTDOOR FAN HEAT MODE (FIG. 6H)



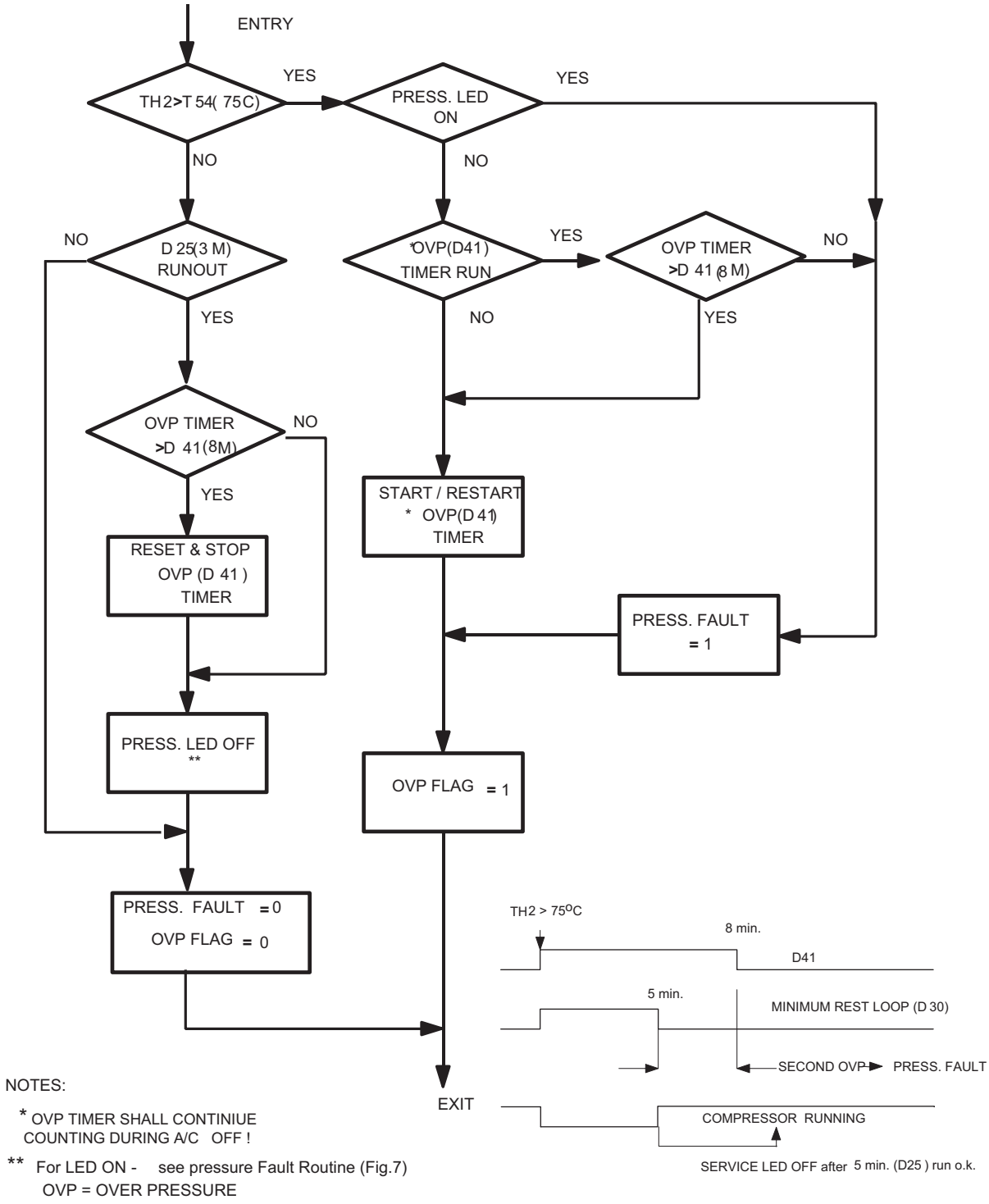
CNT - Local timer

LOP = LOW PRESSURE

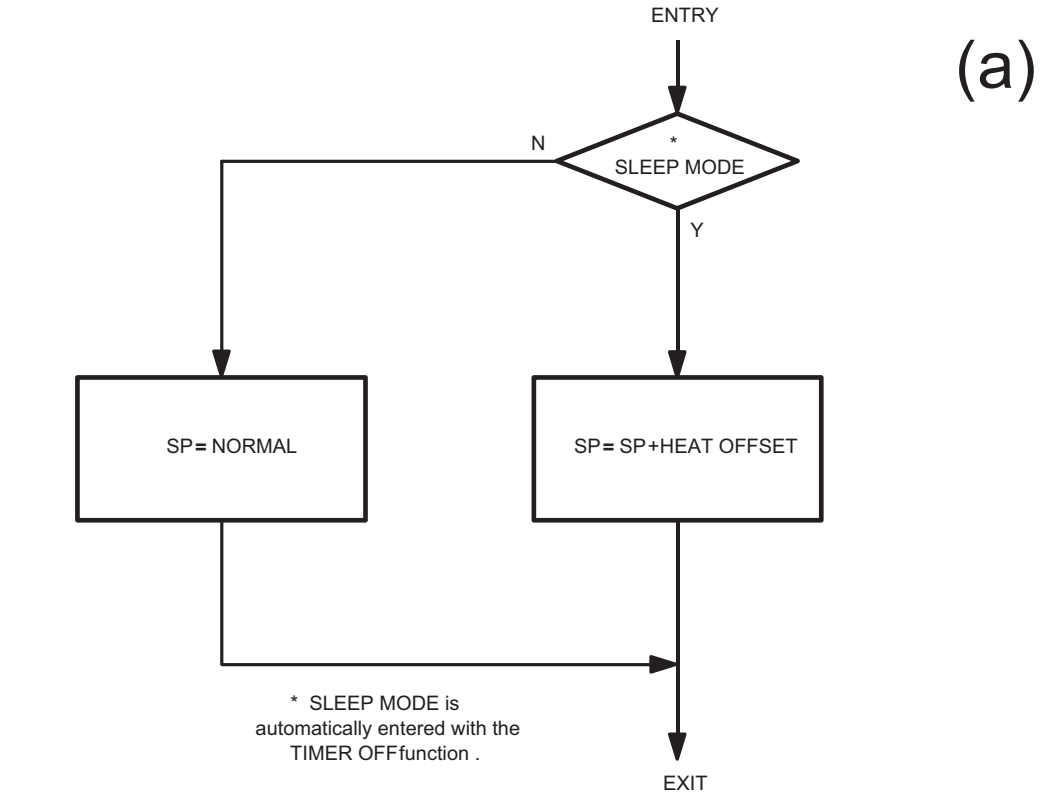
(*) 10 MIN. COMPR. RUN TIME

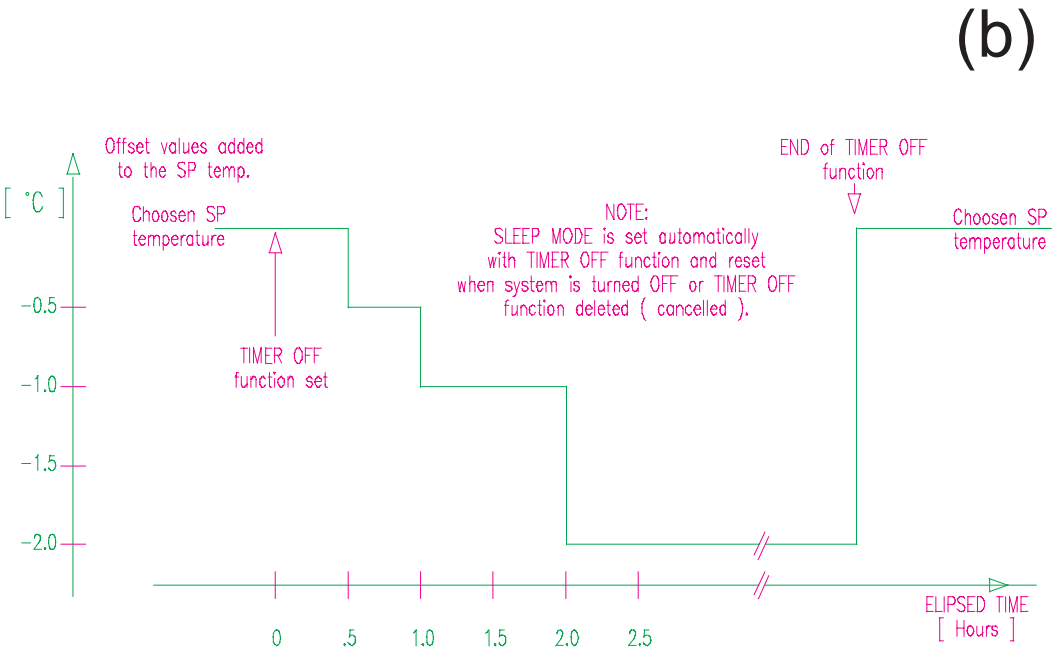
(**) PRESSURE MAINTENANCE INDICATOR (RED LED) SHALL LIT BY THE PRESSURE FAULT ROUTINE Fig. 7

Drawing 51: LOW-PRESSURE (LOP) ROUTINE HEAT MODE (FIG. 6I)

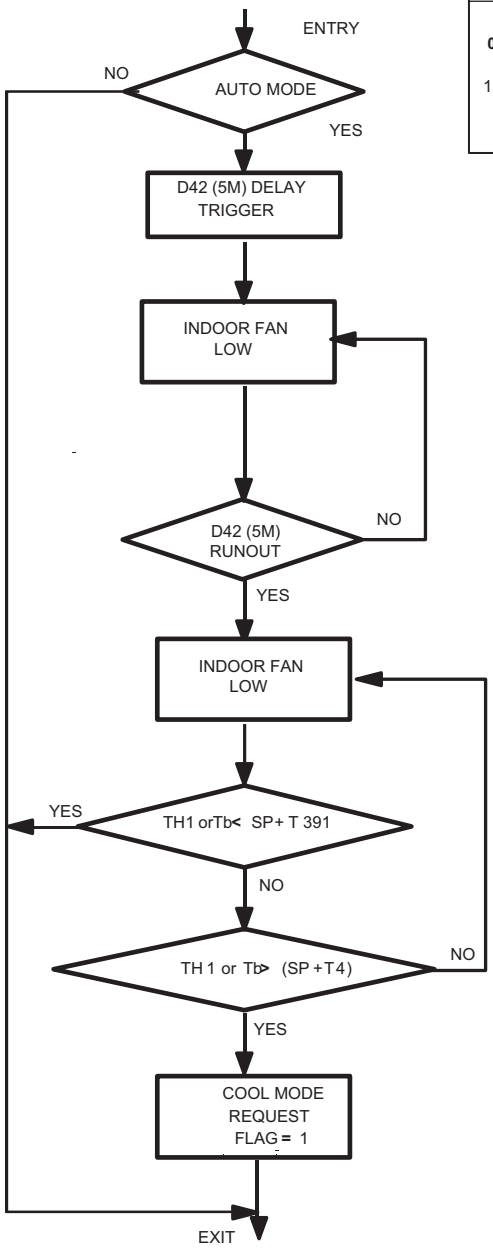


Drawing 52: OVER PRESSURE ROUTINE HEAT MODE (FIG. 6J)



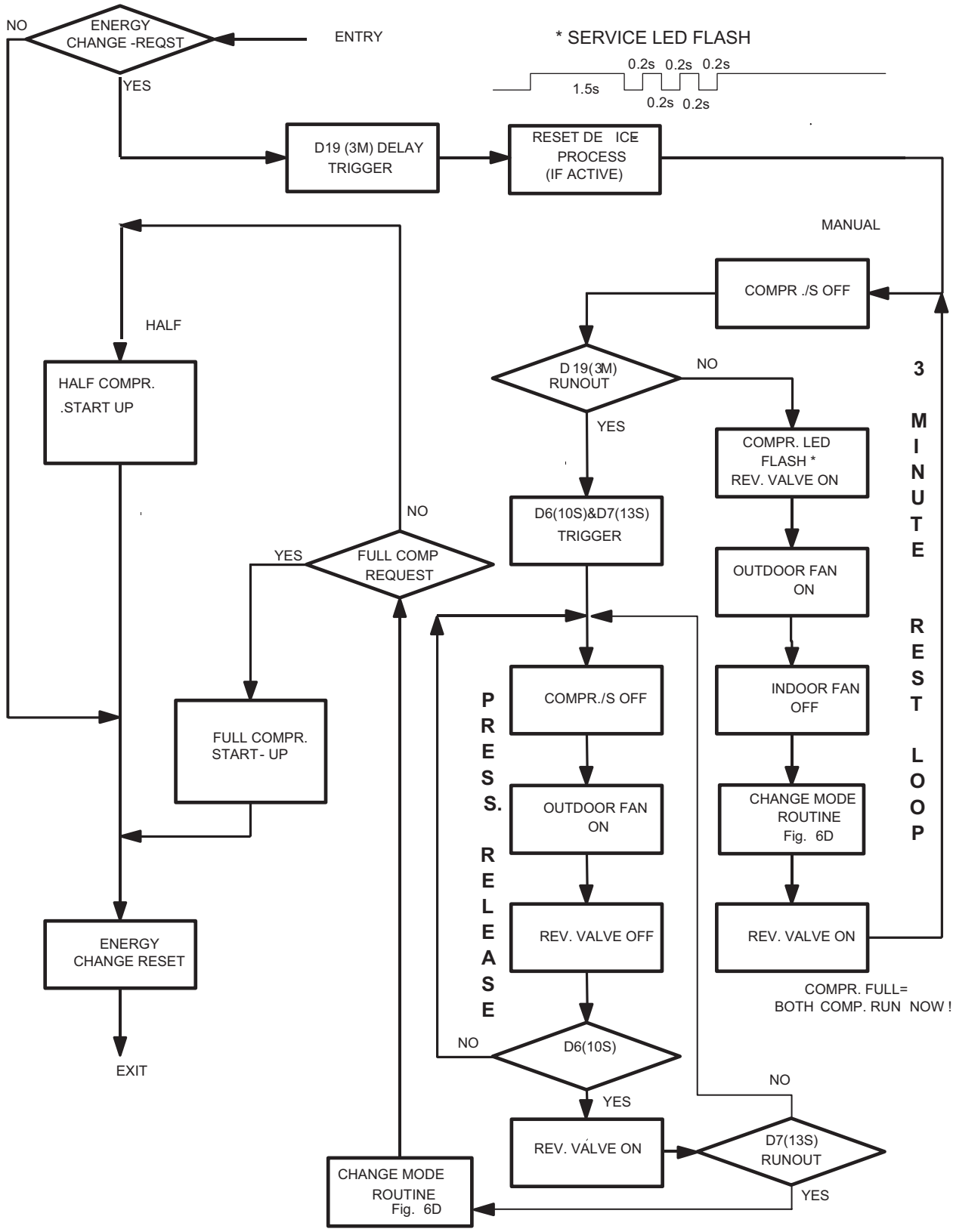


Drawing 53: SLEEP ROUTINE HEAT MODE (FIG. 6K)

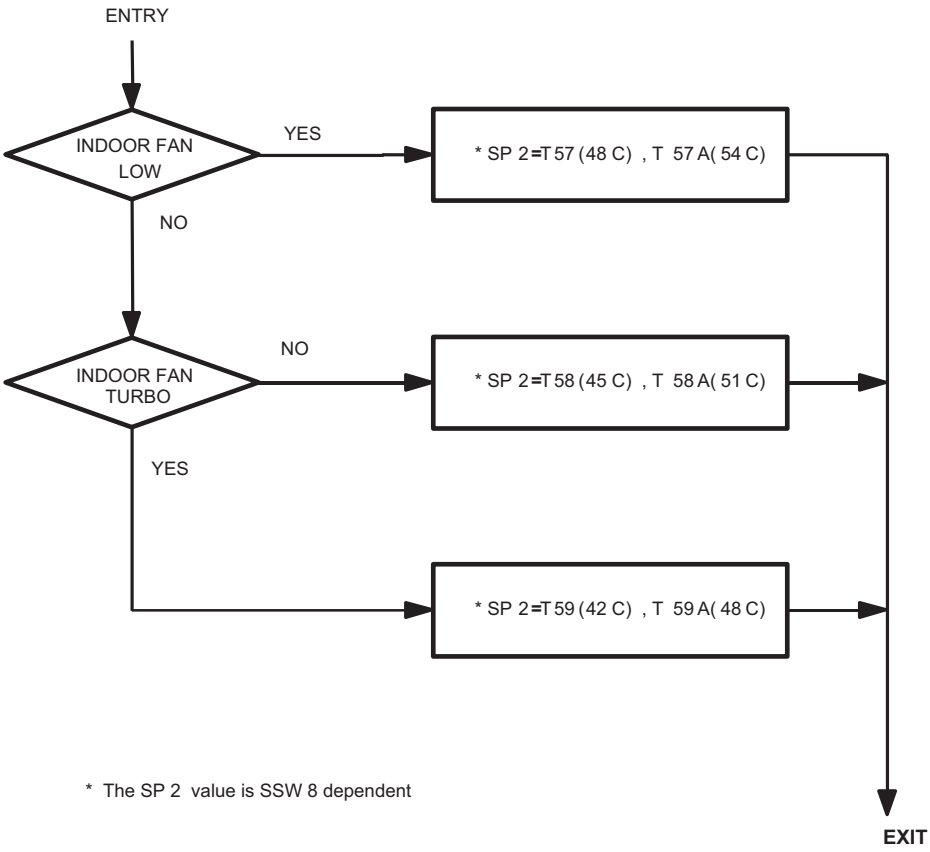


SSW7	T 391	T4	INSTALL.
0	+2°C	+4°C	UPPER
1	-2°C	+1°C	LOWER
	0°C	+2°C	BEACON/ANL

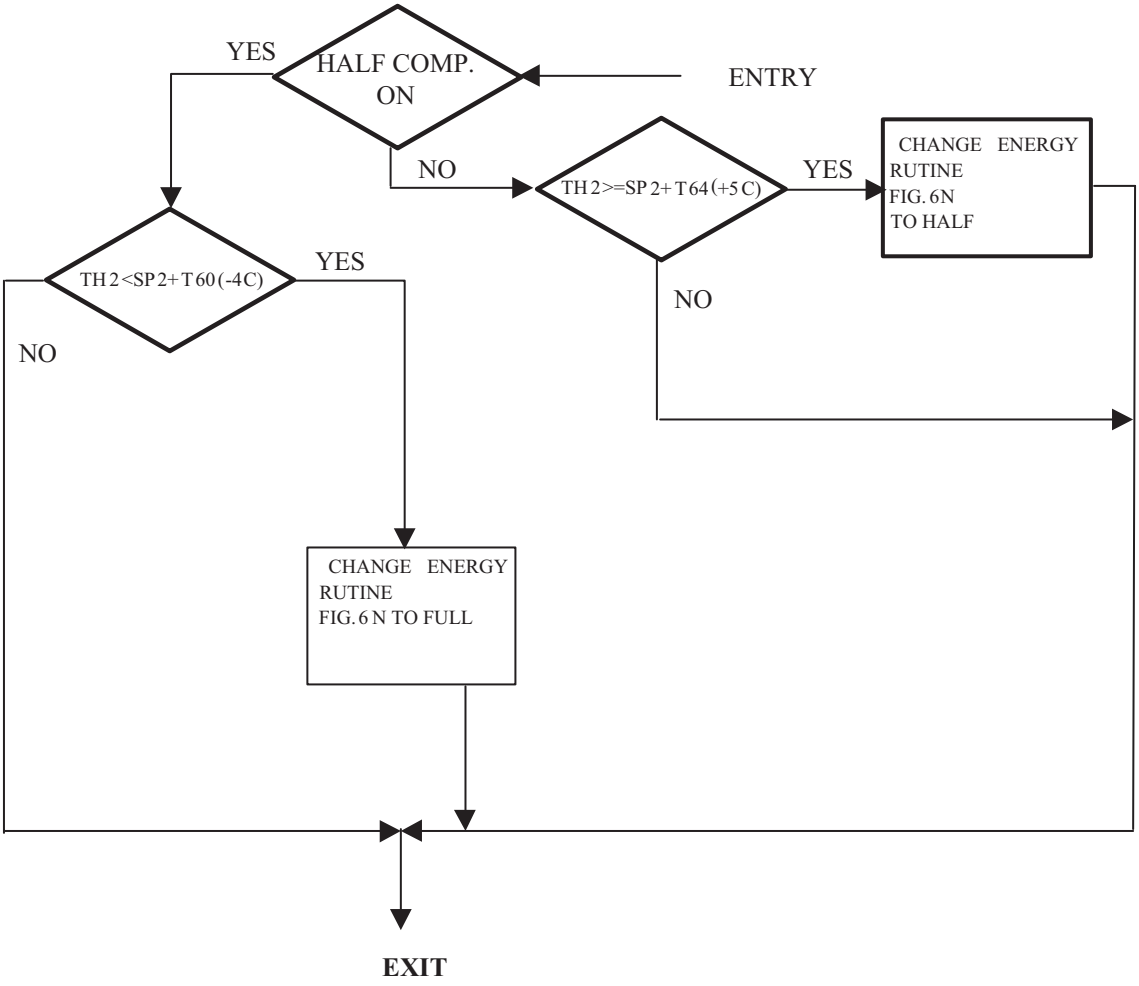
Drawing 54: CONDITIONING ROUTINE (HEAT TO COOL) (FIG. 6L)



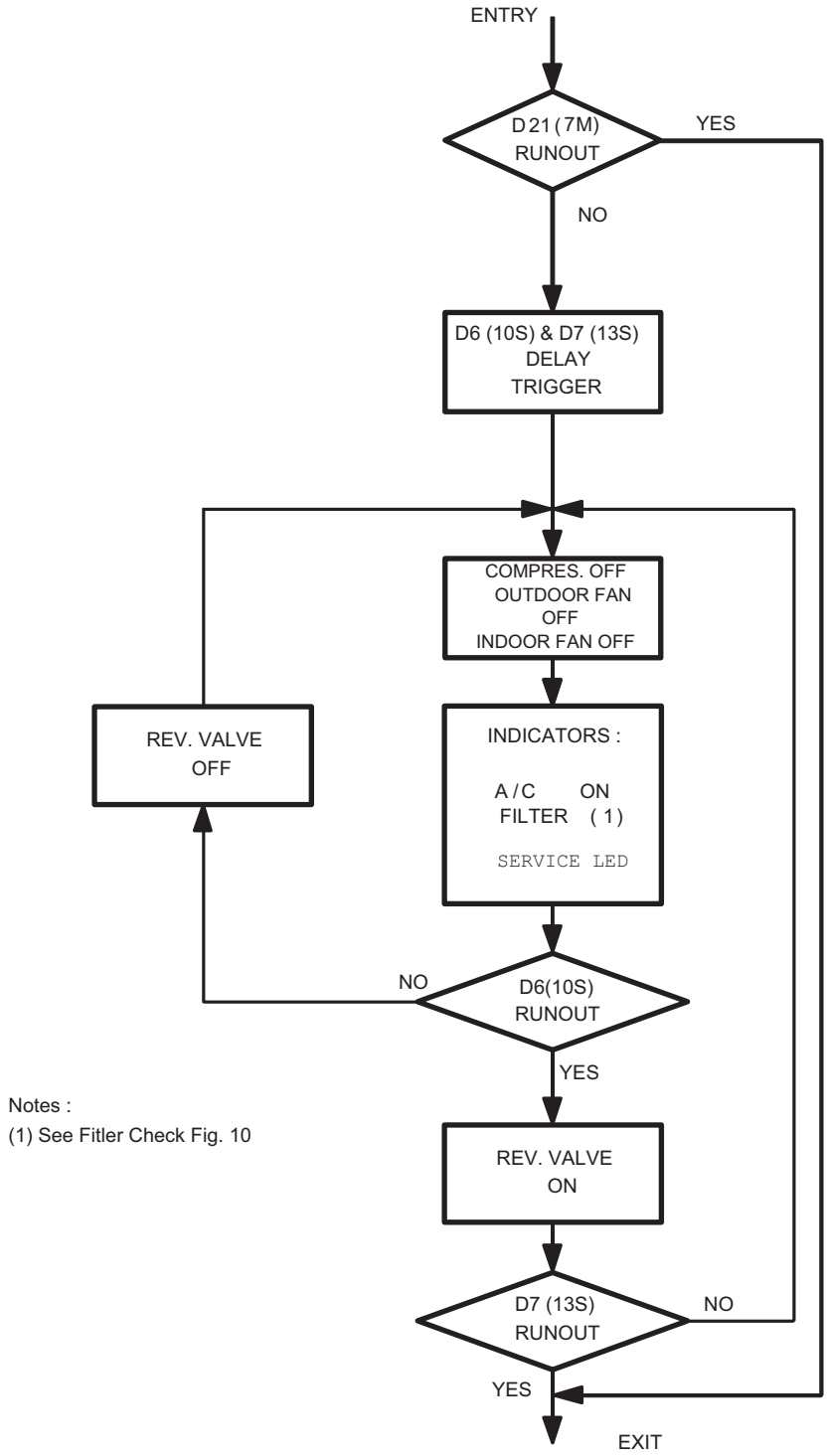
Drawing 55: ENERGY CHANGE ROUTINE HEAT MODE (FIG. 6N)


ENTRY
INDOOR FAN LOW
YES
* SP 2=T 57 (48 C) , T 57A(54 C)
NO
INDOOR FAN TURBO
NO
* SP 2=T 58 (45 C) , T 58A(51 C)
YES
* SP 2=T 59 (42 C) , T 59A(48 C)
* The SP 2 value is SSW 8 dependent
EXIT

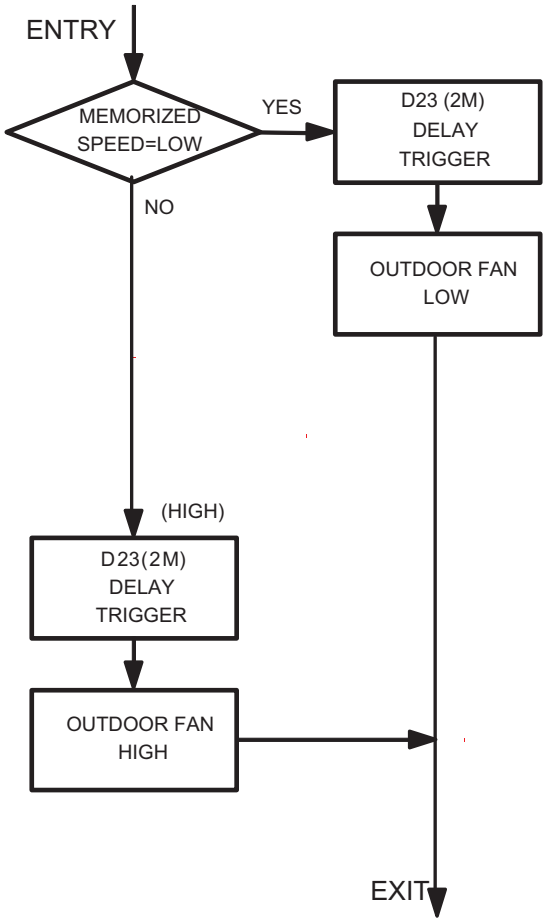
Drawing 56: SP2 VALUES ROUTINE HEAT MODE (FIG. 6O)



Drawing 57: AUTO ENERGY ROUTINE HEAT MODE (FIG. 6P)

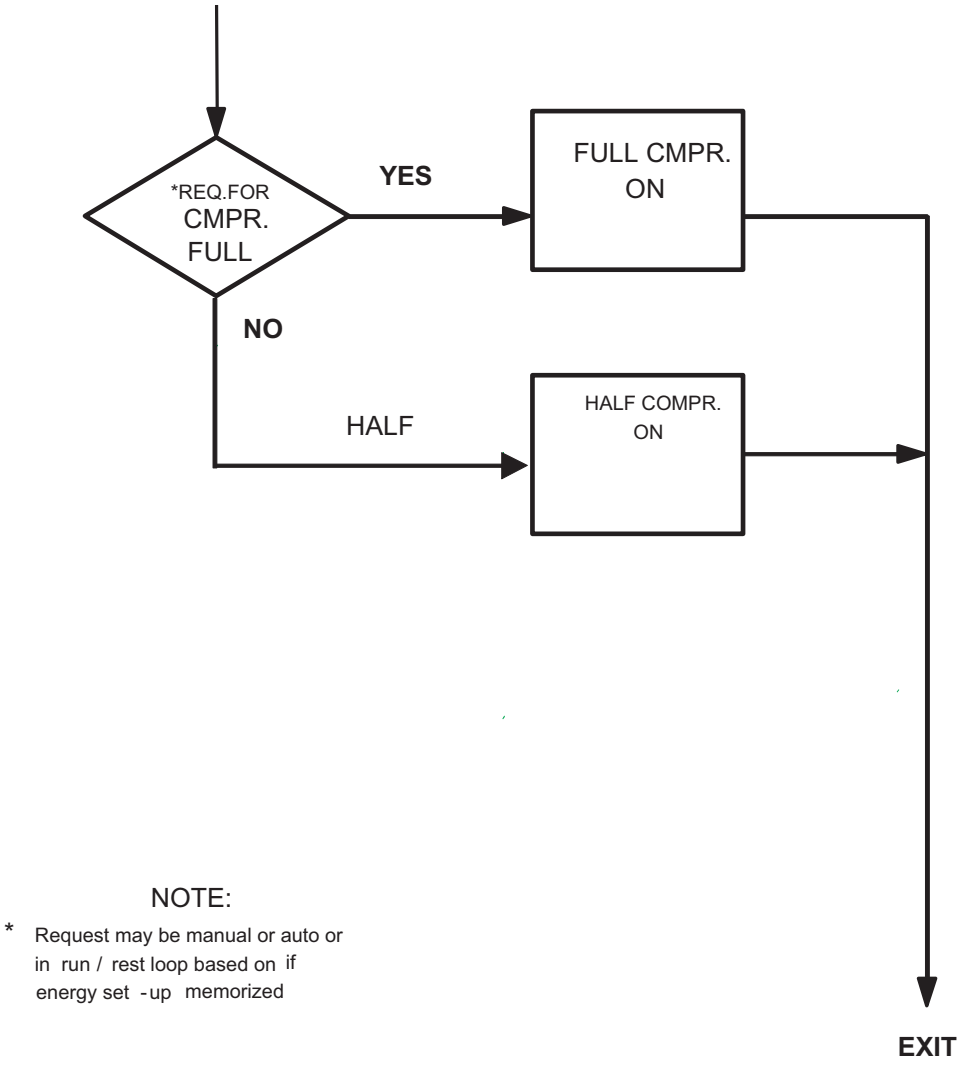


Drawing 58: QUICK RE- ENTRY RELEASE ROUTINE HEAT MODE (FIG. 6Q)

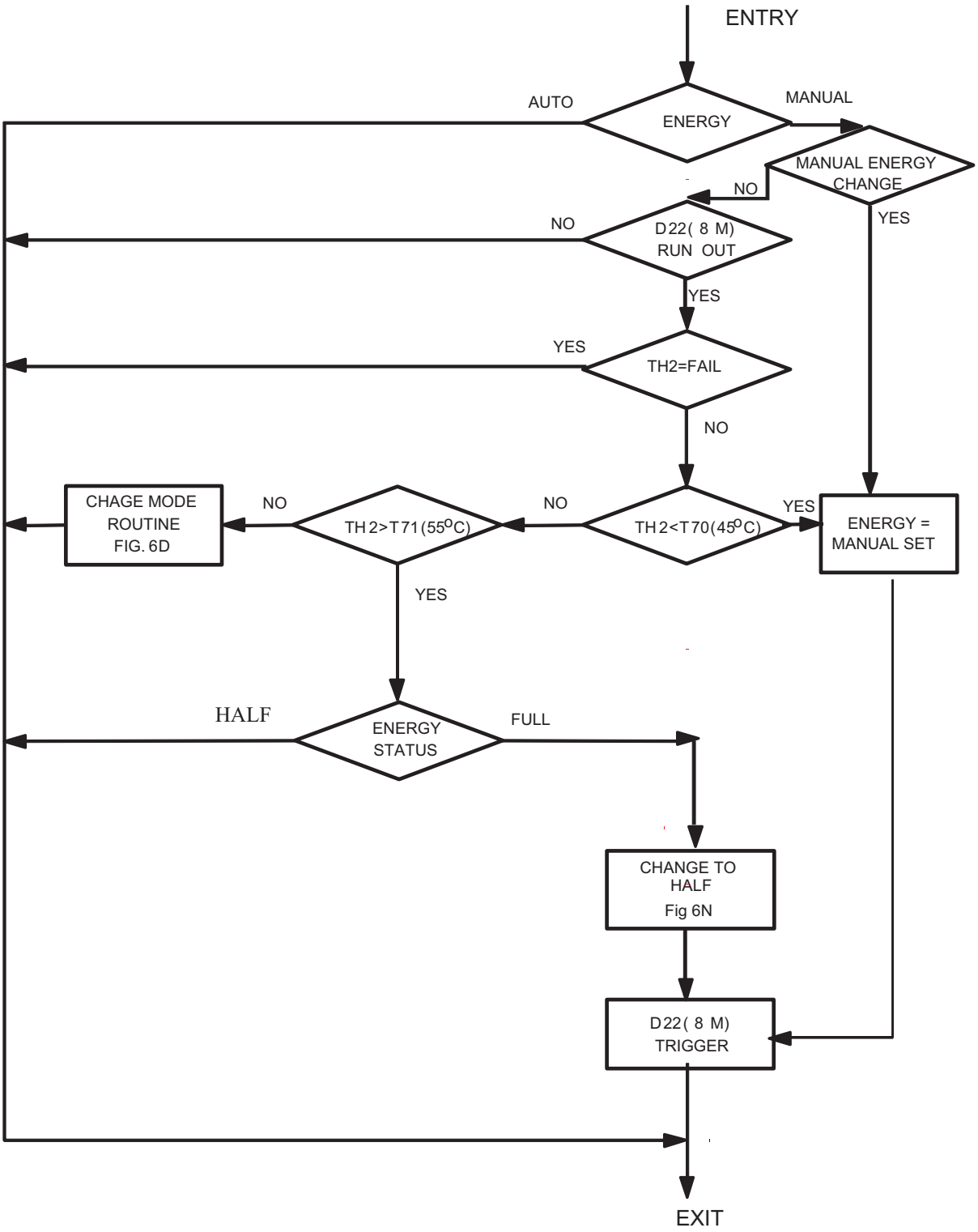


* This routine is based on memorized parameters.

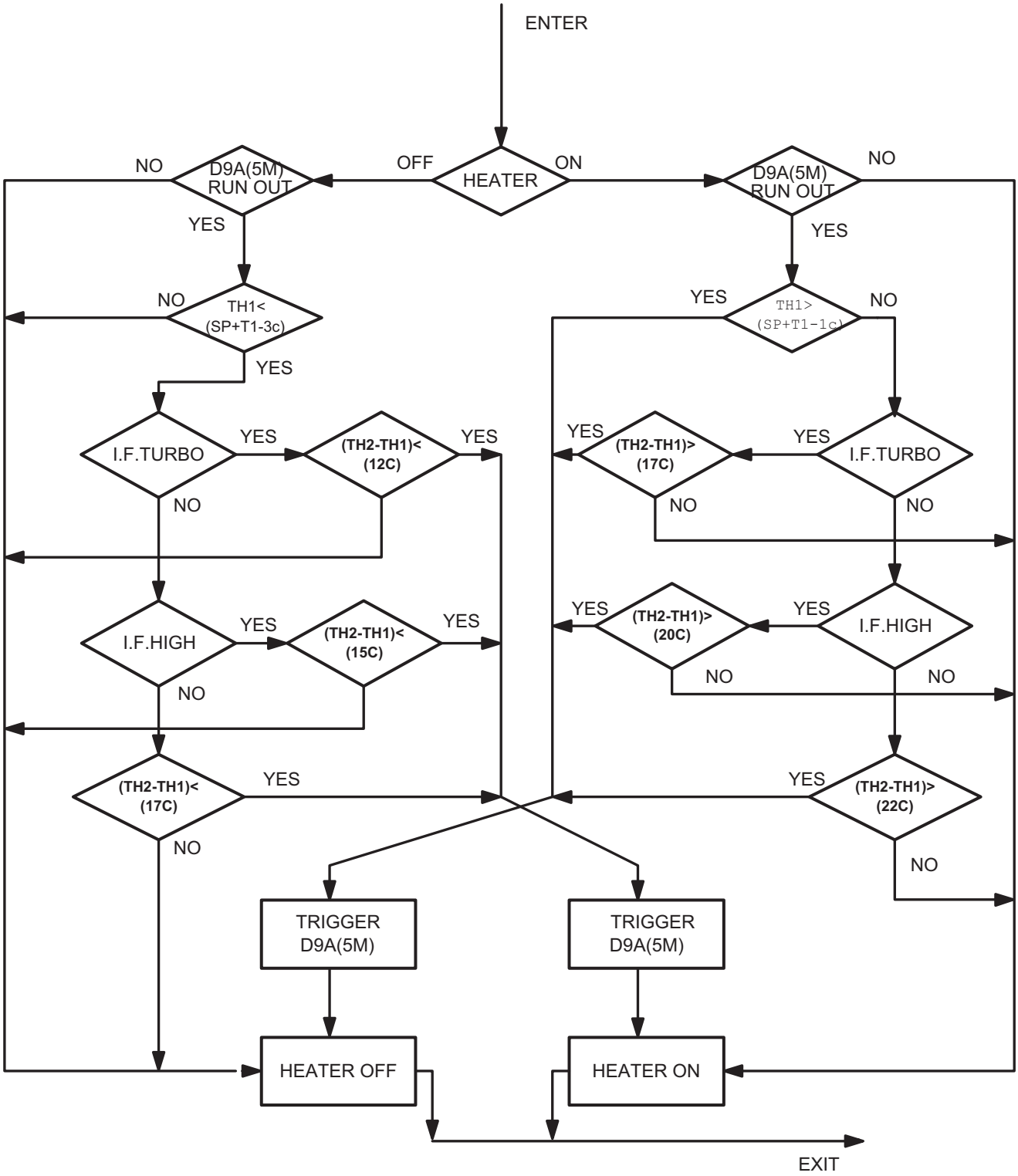
Drawing 59: RECOVER OUTDOOR FAN SPEED ROUTINE HEAT MODE (FIG. 6R)



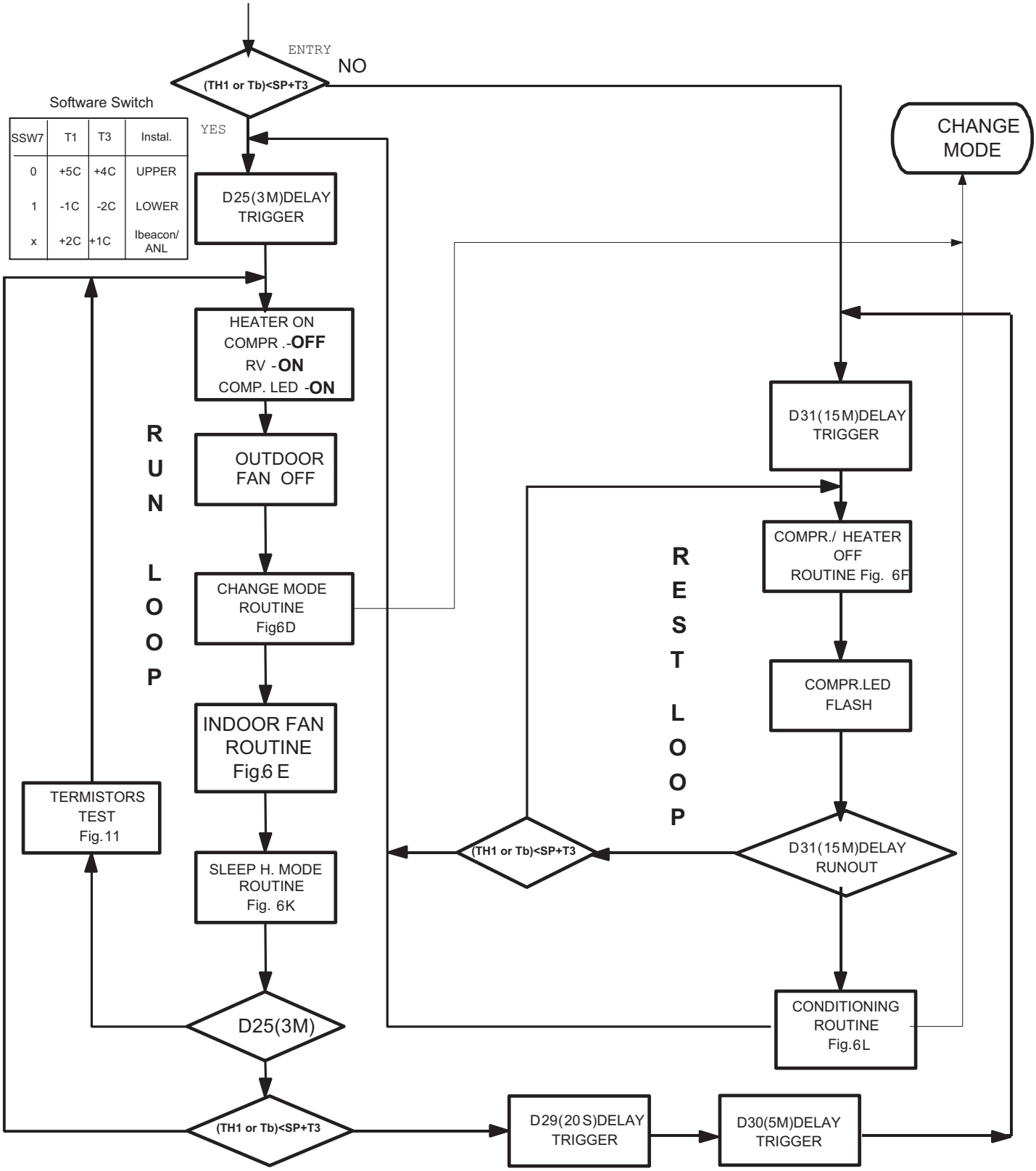
Drawing 60: RECOVER ENERGY SET - UP HEAT (FIG. 6S)



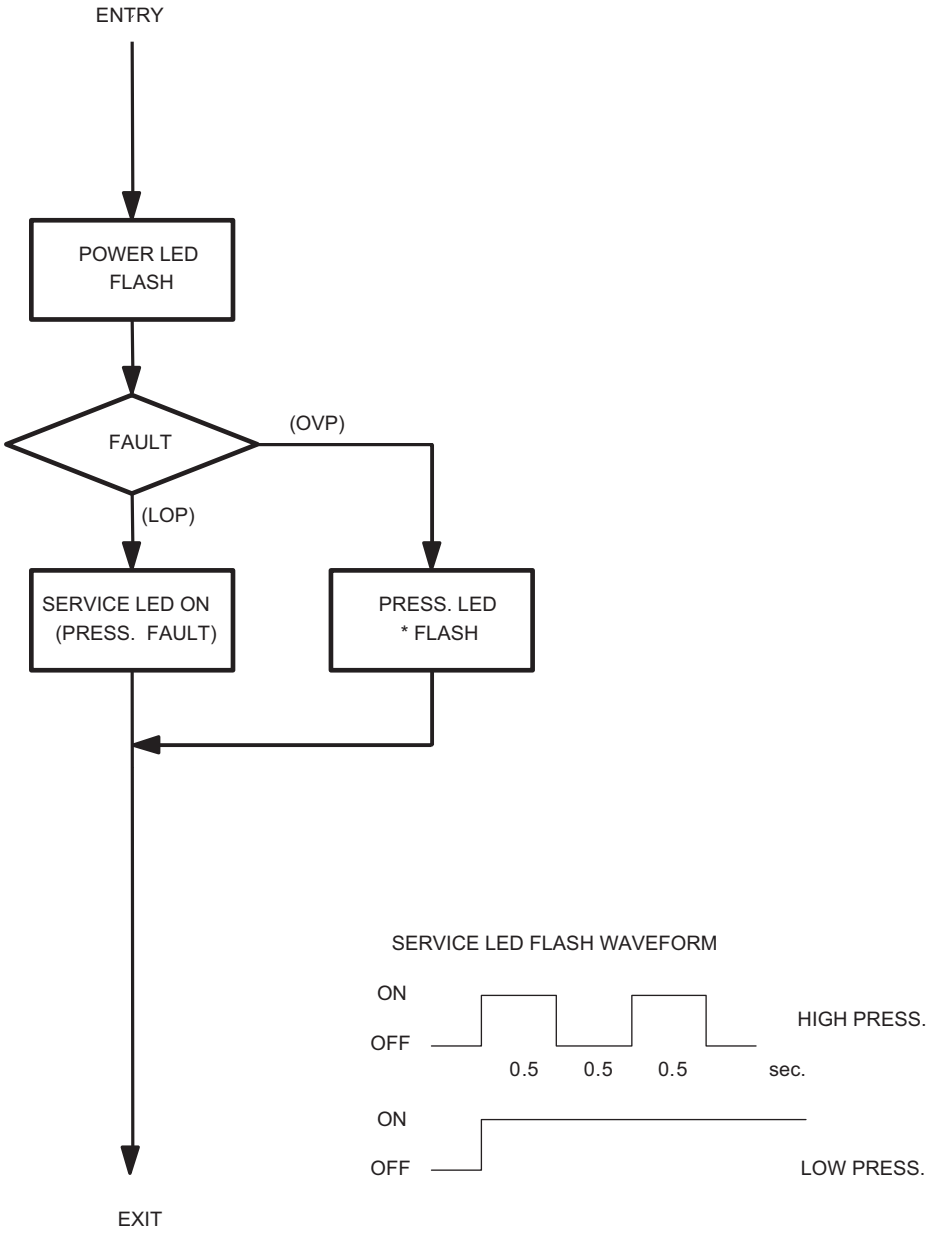
Drawing 61: PRE - OVP ROUTINE - HEAT MODE (FIG. 6T)



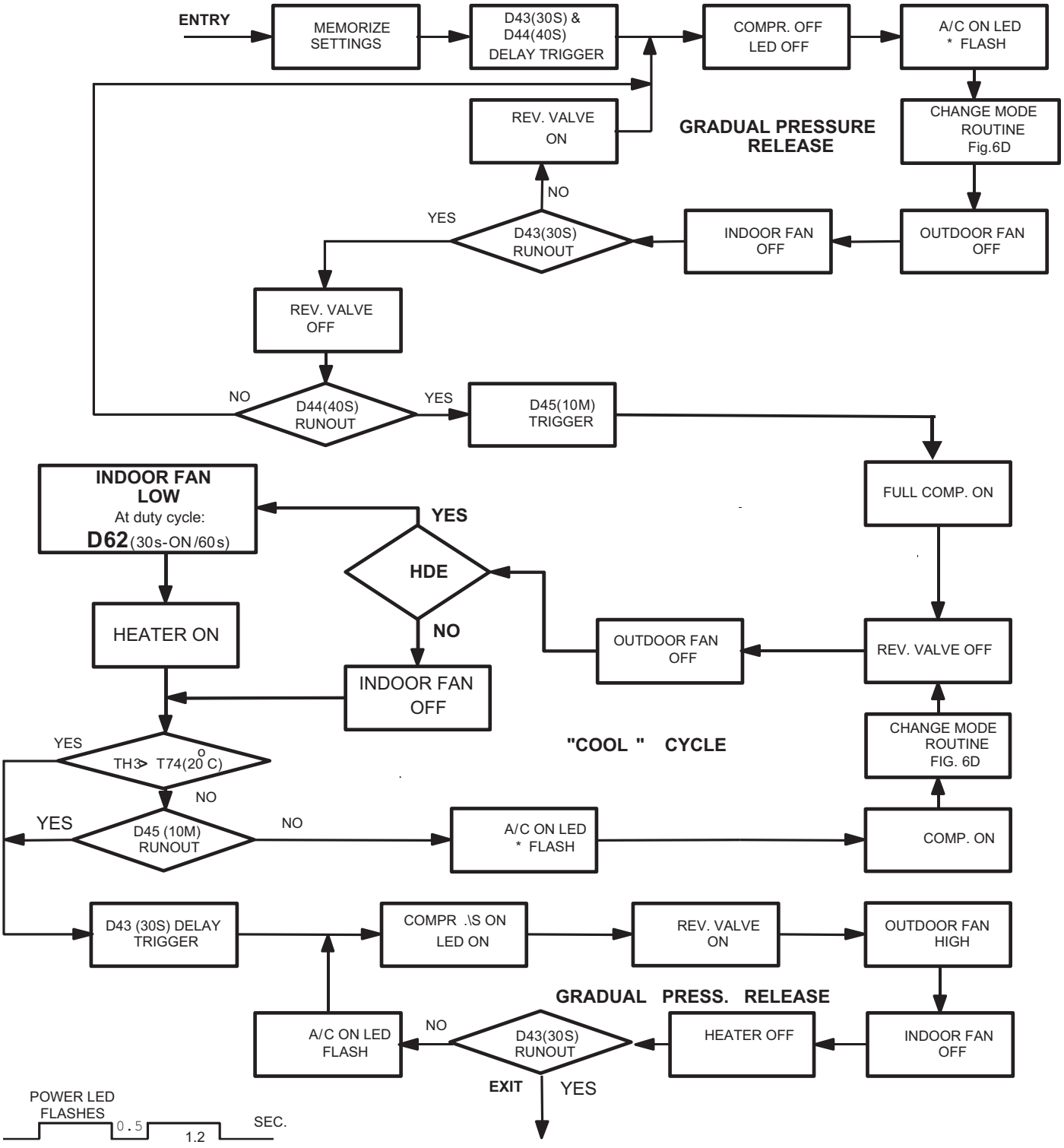
Drawing 62: TAC-600 - HDE HEATER ROUTINE - HEAT MODE (FIG. 6U)



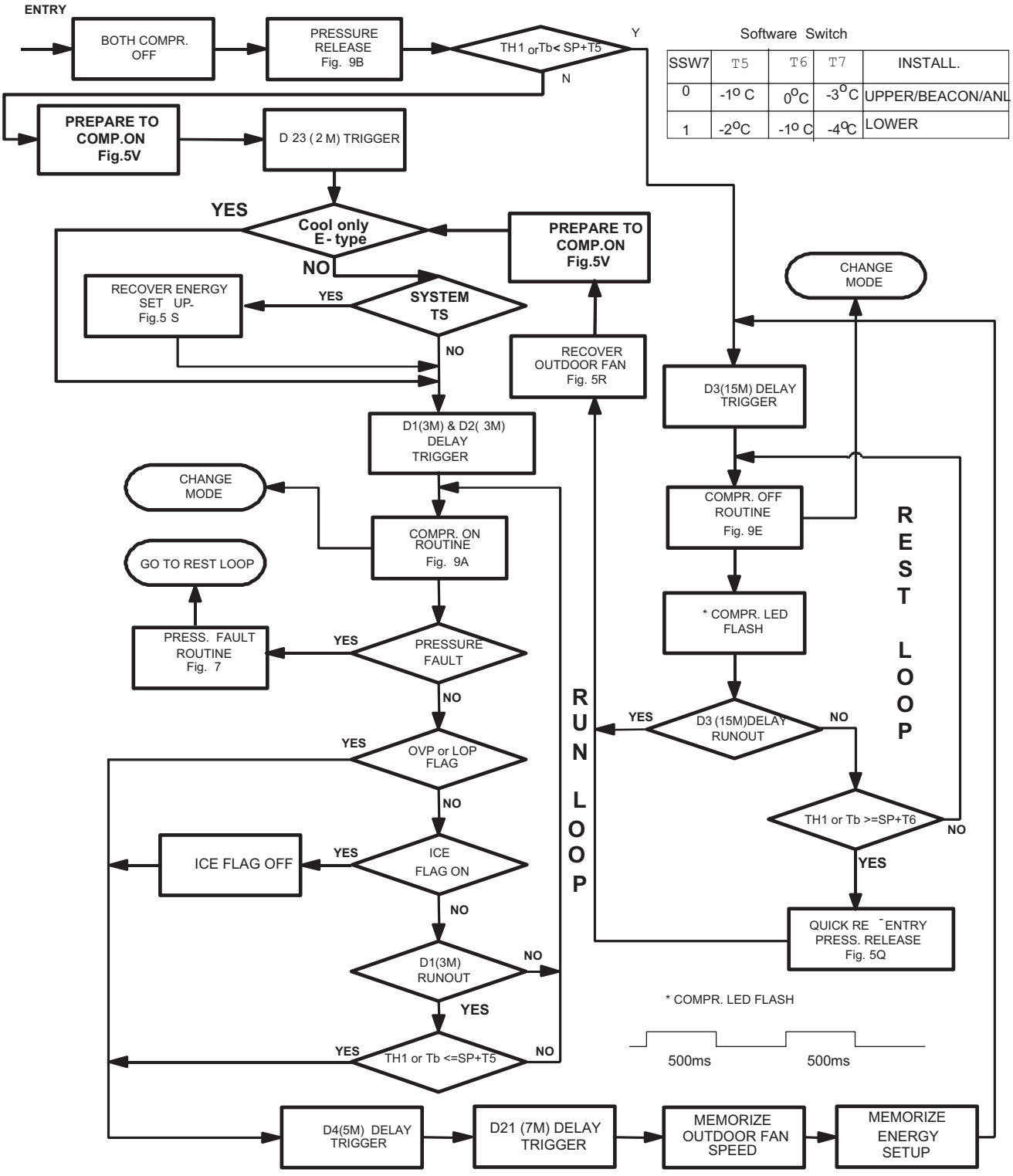
Drawing 63: E-TYPE MAIN HEAT MODE (FIG. 6V)



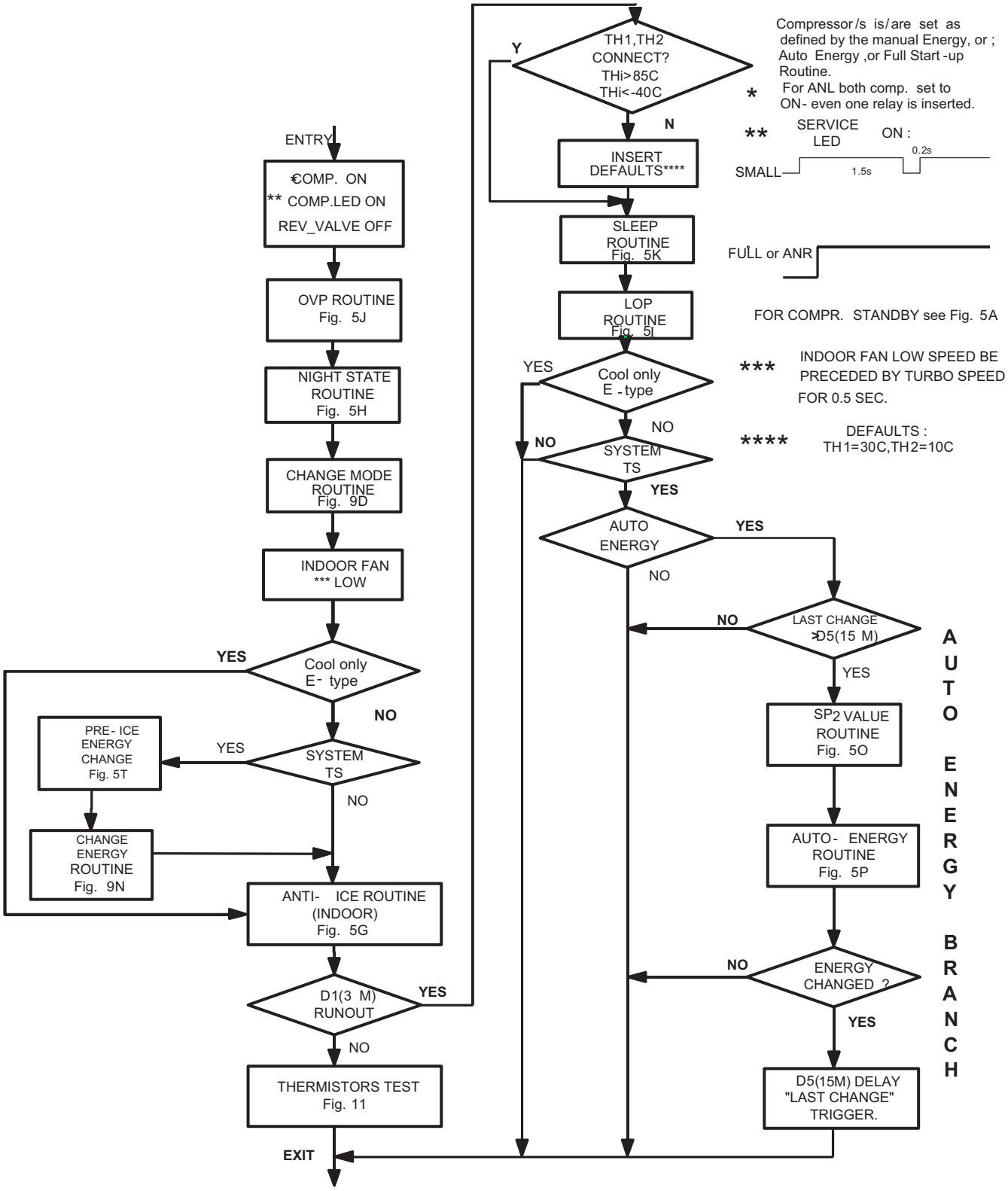
Drawing 64: PRESSURE FAULT ROUTINE (FIG. 7)



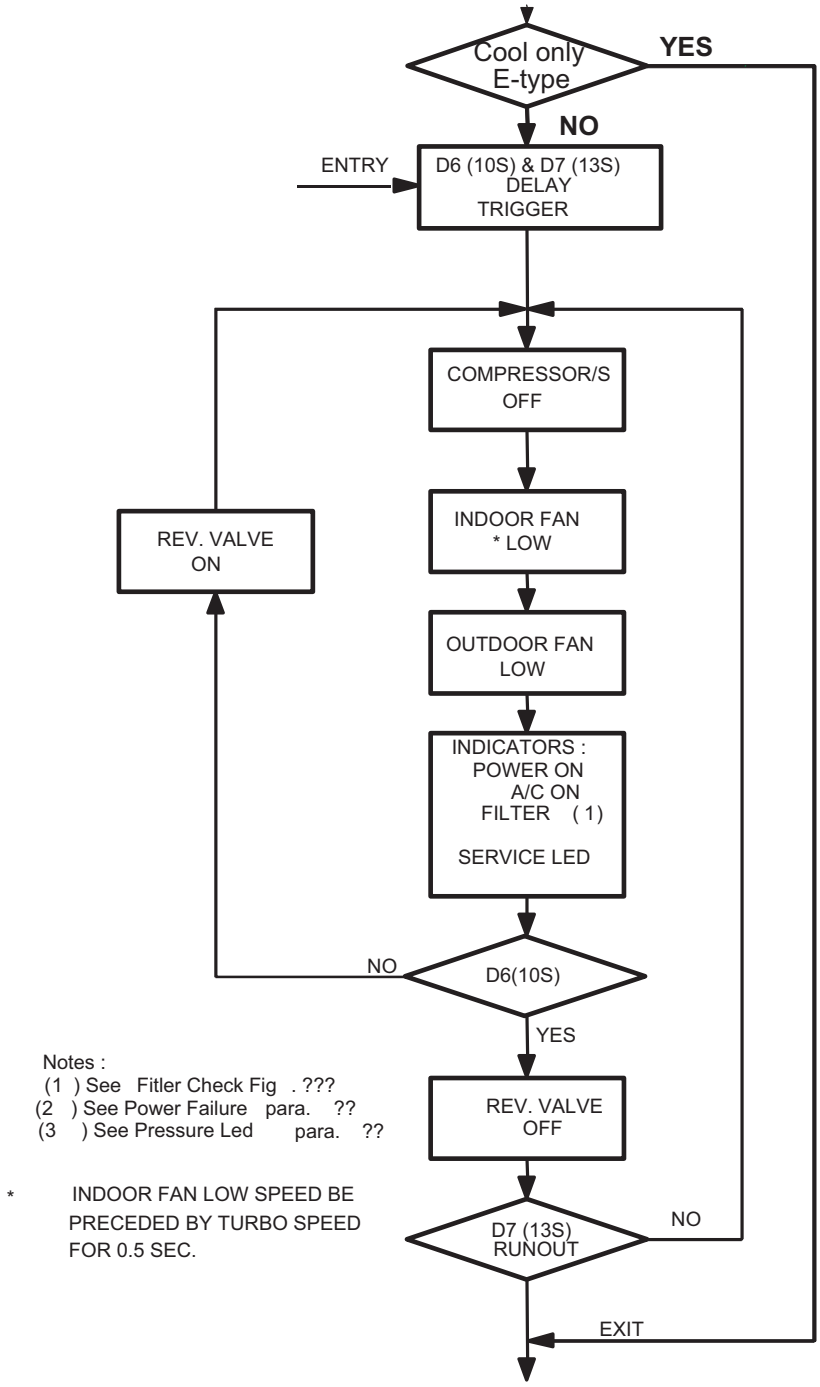
Drawing 65: DE - ICE ROUTINE HEAT MODE (FIG. 8)



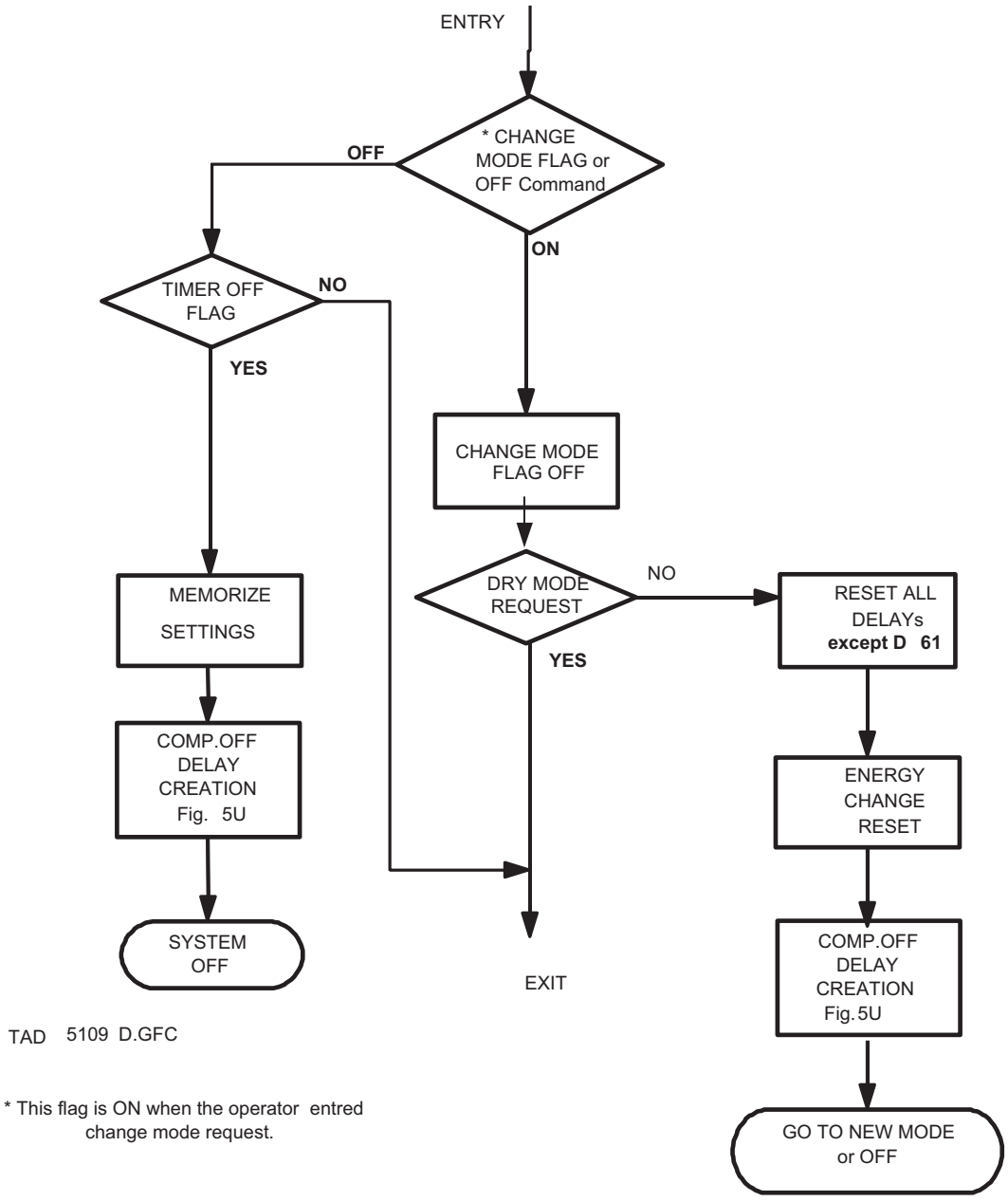
Drawing 66: DRY MODE - MAIN (FIG. 9)



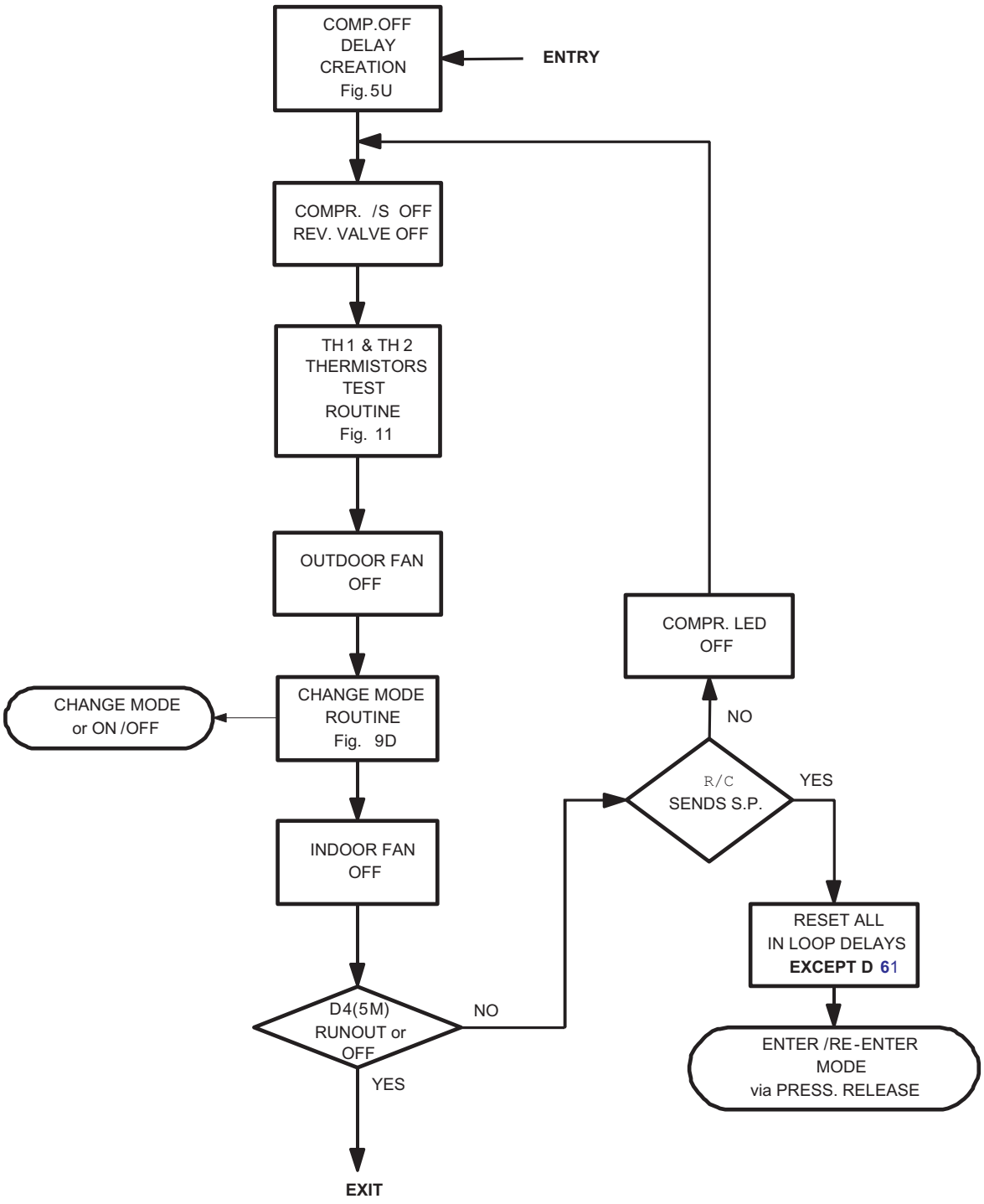
Drawing 67: COMPRESSOR ON ROUTINE, DRY MODE (FIG. 9A)



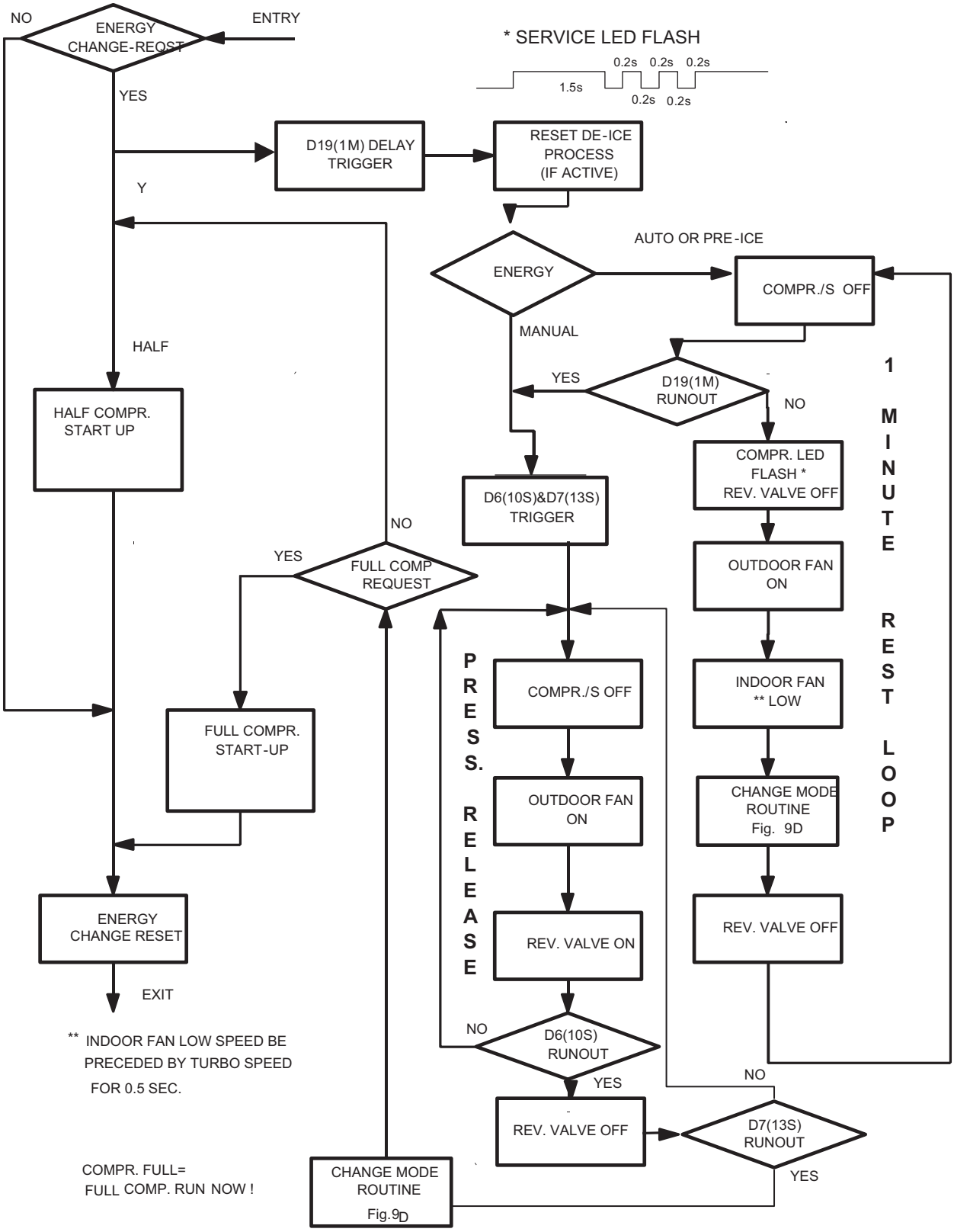
Drawing 68: PRESSURE RELEASE ROUTINE DRY MODE (FIG. 9B)



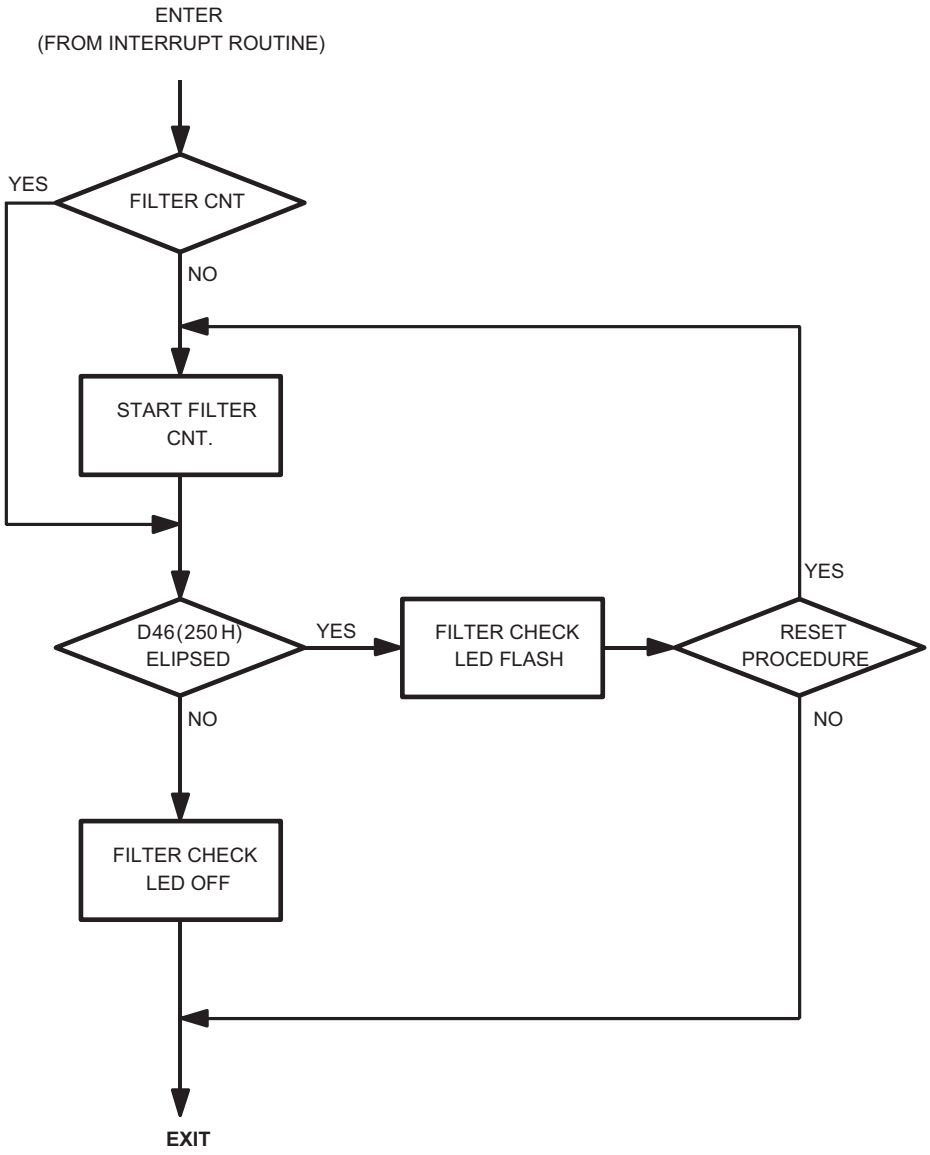
Drawing 69: CHANGE MODE ROUTINE, DRY MODE (FIG. 9D)



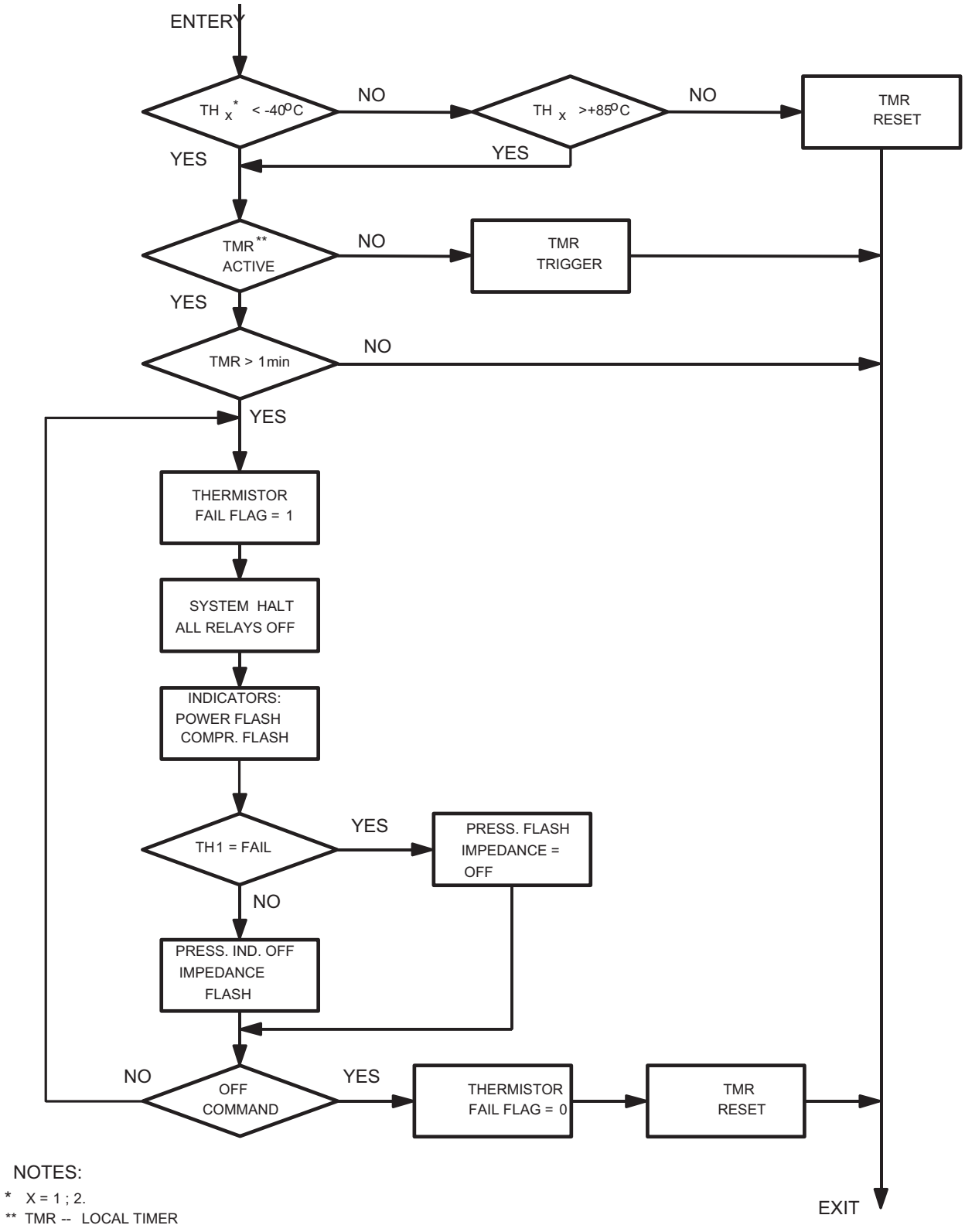
Drawing 70: COMPRESSOR OFF ROUTINE DRY MODE (FIG. 9E)



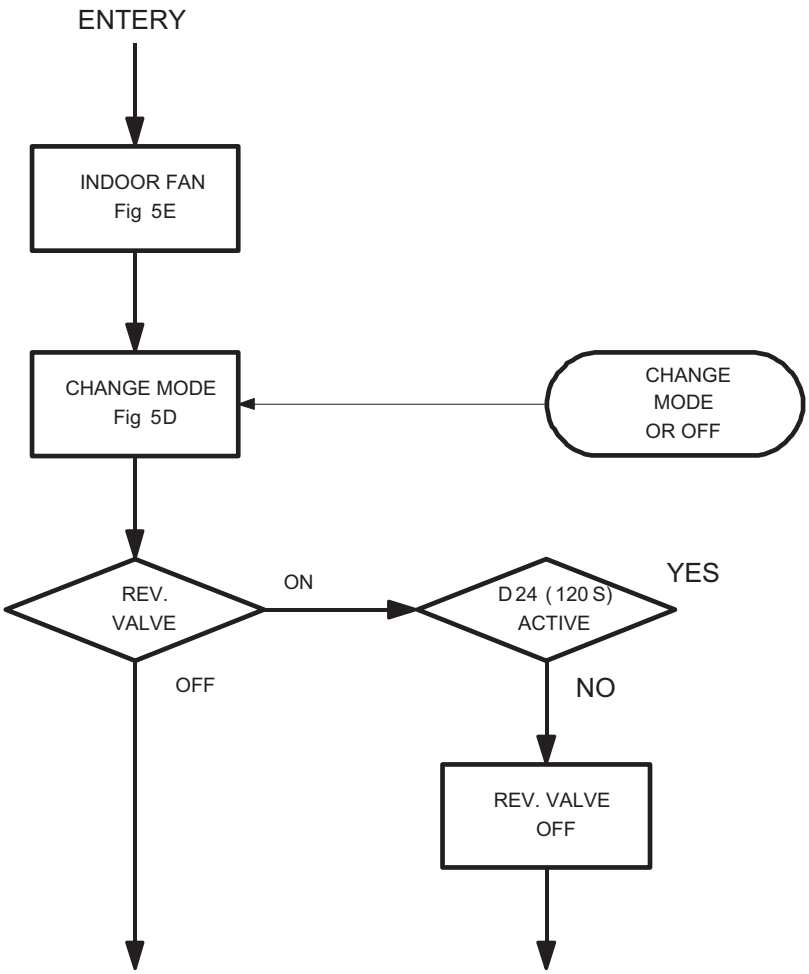
Drawing 71: ENERGY CHANGE ROUTINE DRY MODE (FIG. 9N)



Drawing 72: FILTER CHECK ROUTINE (FIG. 10)



Drawing 73: TH1-TH2 THERMISTORS TEST ROUTINE (FIG. 11)



Drawing 74: FAN ONLY MODE ROUTINE (FIG. 12)

4 Displays, Alarms and Switches

The table below lists working mode and alarm indications for TAC600TGL and TAC601/3 Controllers (with on-board displays) and TAC640 Controllers with TAC660GFL/TNL/TNE displays (4 LEDs).

Indicator Name	Indication	Function
Power ON LED (Air Con. on GFL/TNL)	Green (ON)	ON state- air conditioner is ON and functioning normally
	Green (flashing)	Air Conditioner is in: de-ice routine, Prepare to Comp. ON routine, Change Energy Routine, Rest loop (of Cool, Heat, Dry and E_Type main modes)
Power OFF LED	Red (ON)	OFF state - air conditioner is OFF
	Red (flashing)	Fault (LED flashes for any kind of fault)
Timer LED	Red (flashing)	The air conditioner is OFF, the timer is activated and will switch ON air conditioner at the set time
	Red (ON)	The air conditioner is ON, the timer is activated and will switch OFF the air conditioner at the set time
	Red (OFF)	Timer is OFF
Filter LED	Red (ON)	Filter needs to be cleaned
	Red (OFF)	No need to clean filter
Service LED (on Controller) Insert pulse diagrams	Red (ON)	Compressor working
	Red (flashing)	Air conditioner is in rest loop
	Single pulse	TH1 fault: short or disconnected
	Double pulse	TH2 fault: short or disconnected
	Triple pulse	Low pressure fault
	4 pulses	High pressure fault
	5 pulses	Low Voltage fault
	6 pulses	High Voltage fault
	7 pulses	Compressor in single mode (TAC640 with T/S)

Table 11: Working Mode and Alarm Indications for Controllers with TAC660GFL/TNL/TNE Displays

The table below lists working mode and alarm indications for TAC640 Contrdlers with TAC660RTX/GCL displays (8 LEDs and 2 Digit Numeric Display)

Indicator Name	Indication	Function
Power LED	Red (ON)	OFF state
	Red (flashing)	Fault (LED flashes for any kind of fault)
Cool mode LED	Green (ON)	Cool mode or Dry mode- ON state- functioning normally
	Green (flashing)	Water drain routine, Rest loop or de-ice routine
Heat mode LED	Red(ON)	Air conditioner is in Heat mode
	Red (OFF)	Heat mode is off
Fan mode LED	Amber (ON)	Fan mode ON
	Amber (OFF)	Fan mode OFF
Timer LED	Red (flashing)	The air conditioner is OFF, the timer is activated and will switch ON the air conditioner at the set time
	Red (ON)	The air conditioner is ON, the timer is activated and will switch OFF the air conditioner at the set time
	Red (OFF)	Timer is OFF
Fan LED low speed	Amber	Fan is operating on low speed
Fan LED high speed	Amber	Fan is operating on high speed
Fan LED turbo speed	Green	Fan is operating on turbo speed
Numeric Display/Service LED(on Controller)	Red (ON)	Run loop of modes: Cool, Heat, Dry,
	Red (flashing)	Air conditioner is in rest loop
	01/single pulse	TH1 fault: short or disconnected
	02/double pulse	TH2 fault: short or disconnected
	03/ triple pulse	Low pressure fault
	04/4 pulses	High pressure fault
	05/5 pulses	Low Voltage fault
	06/6 pulses	High Voltage fault
	7 pulses	Compressor at Single mode (TAC640 with T/S)

Table 12: Working Mode and Alarm Indications for Controllers with TAC660RTX/GCL Displays

4.1 Resetting System LEDs after Fault Solved

TNL/GFL[1]	Slide switch to OFF position (resets LED) and back to either Auto or Remote	
RTX	Press and hold the ON/OFF button for 5 seconds. The buzzer will sound and the Fault indicators will reset.	
TGL/GCL[2]	To reset Fault LED: when the air conditioner is OFF	Press the Breaker button for a moment and move the sliding switch to Auto mode.
	To reset Fault LED	Press the Breaker button for a moment, the unit switches OFF and the LEDs are reset
	To reset Filter LED: when the air conditioner is ON or OFF	Press and hold the Breaker button for 5 seconds

Table 13: Resetting System LEDs

[1] The TNL/GFL models have a three position sliding switch corresponding to the following modes: Auto, OFF, Remote Control

[2] For the TGL the Breaker button is on the Main board. For the GCL the Power button on the display panel functions as the Breaker button.

5 Troubleshooting

The table below lists troubleshooting indications for TAC600TGL and TAC601/3 Controllers (with on-board displays) and TAC640 Controllers with TAC660GFL/TNL/TNE displays (4 LEDs).

Indicator	Indication	Problem	Solution
Filter LED	Red (ON)	Filter needs to be cleaned	Clean filter and reset LED
Power OFF LED	Red (flashing)	LED flashes for any kind of fault	Refer to Service LED(on Controller) specific fault indication
Service LED	Single pulse	TH1 fault: short or disconnected	Connect if disconnected. Replace if shorted.
	Double pulse	TH2 fault: short or disconnected	Connect if disconnected. Replace if shorted.
	Triple pulse	Low pressure fault	Check gas pressure, add if needed.
	4 pulses	High pressure fault	Check gas pressure, release if needed.
	5 pulses	Low Voltage fault	Check line voltage.
	6 pulses	High Voltage fault	Check line voltage

Table 14: Troubleshooting for Controllers with TAC660GFL/TNL/TNE Displays

The table below lists troubleshooting indications for TAC640 Controllers with TAC660RTX/GCL displays (8 LEDs and 2 Digit Numeric Display)

Indicator	Indication	Problem	Solution
Power LED	Red (flashing)	Filter needs to be cleaned	Clean filter and reset LED
Numeric display	01	TH1 fault: short or disconnected	Connect if disconnected. Replace if shorted.
	02	TH2 fault: short or disconnected	Connect if disconnected. Replace if shorted.
	03	Low pressure fault	Check gas pressure, add if needed
	04	High pressure fault	Check gas pressure, add if needed
	05	Low Voltage fault	Check line voltage.
	06	High Voltage fault	Check line voltage

Table 15: Troubleshooting for Controllers with TAC660RTX/GCL Displays

6 Appendix A: Replaceable Parts

6.1 Controllers*

Model No.	Tadiran Part No.	Description
TAC600	51303533900	Controller for TGL 9-25
TAC600	51303534800	Controller for TGL 25
TAC603	51303535300	Controller for TGL 30
TAC601	51303536000	Controller for TGL 33, 35
TAC640	51303532350	Controller for GFL, TNL20-50, TFL 9-15, AN, AVL, TS, and GCL
Fuse	-	5x20, 6.3Amp, Slow-Blow

Table 16: Controller Catalogue Numbers

6.2 Display Devices

Model No.	Tadiran Part No	Description
TAC660GFL	51303534300	Display GFL
TAC660TNL	51303512400	Display TNL 20-50, TGL 50
TAC660TFE	51303514000	Display TNL 9-15
TAC660GCL	51303534500	Display GCL 300-500
TAC660RTX	51303532200	Display ANL, AVL, GM, CAL

Table 17: Display Catalogue Numbers

***Field replacement of any component in or on the controller is not authorized.**

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